ELECTRICAL WEST

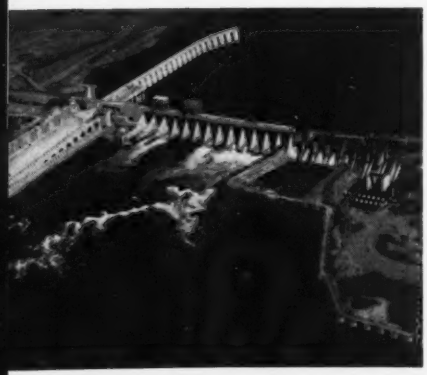
Part I

April 1953
50 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.

PCEA Meets the People..... 116

Aluminum Bus Speeds Installation 102



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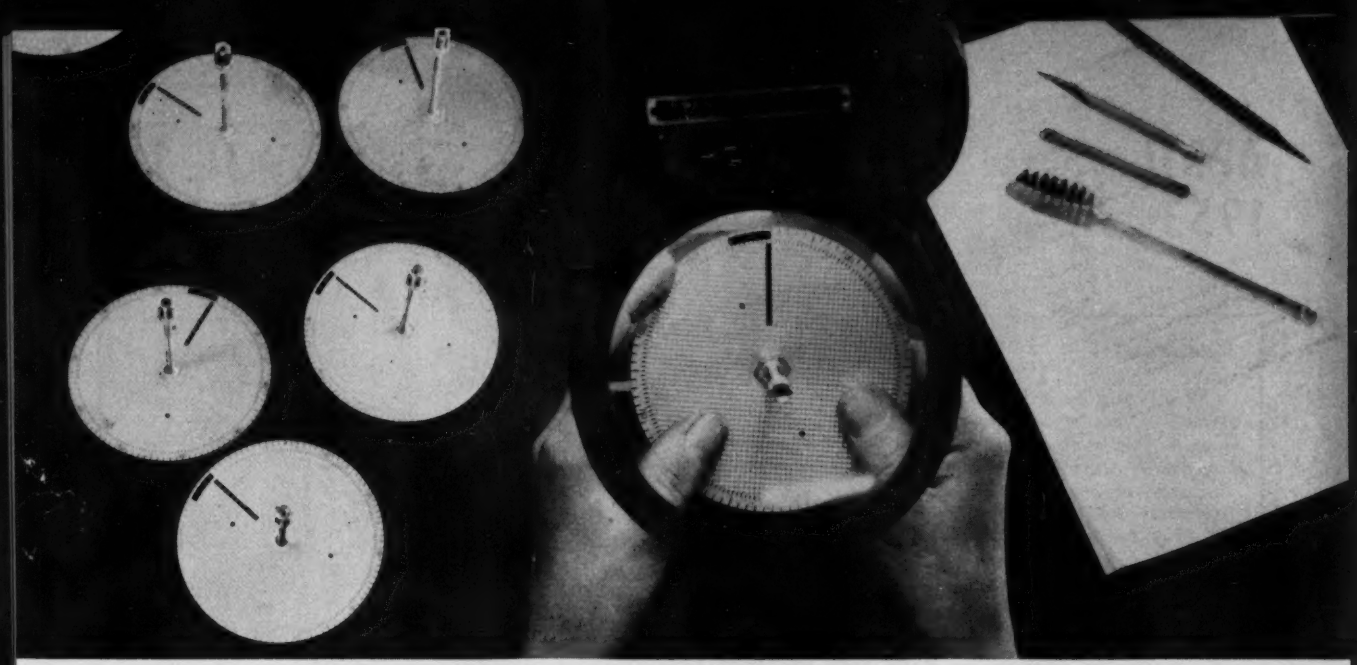
Manufacturers' Directory Issue

By Serving Central and Southern California we serve the world!

Edison electricity—at work in Central and Southern California factories, farms and homes—has played an important part in the Southland's progress for more than half a century. Today, Edison lines supply power for almost every type of industry requiring mechanization for efficient, economical production. And whether goods are manufactured or processed, preserved or handled, electric power is a prime mover for production and progress. That is how Edison electricity "serves the world." It is an essential factor behind the "Made in California" label, which is the mark of quality known in every corner of the globe.

Edison **SOUTHERN CALIFORNIA EDISON COMPANY**



Revolutionary design, plus rigid quality control, gives assurance that . . .

Magnetic Suspension System of I-50 Meter Eliminates Need for Bearing Replacement

Magnetic suspension of the rotor in General Electric's I-50 watthour meter continues to prove its ability to eliminate bearing maintenance.

First, by life tests on bearing systems. For example, in one series of such tests, the systems were subjected to 142,000,000 revolutions at 79 times normal side thrust—equal to *115 years* of normal meter service. *No wear* could be measured on the graphite guide bushings.

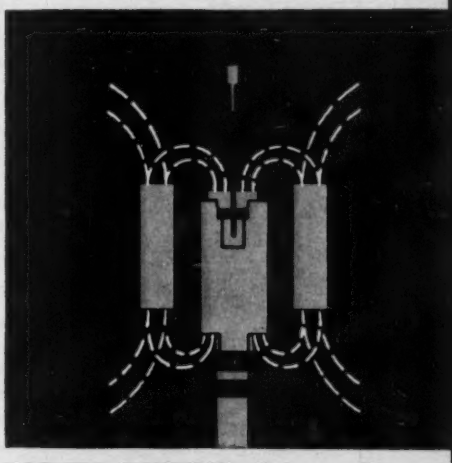
Second, by life tests on complete meters. Carried on for more than ten years, these tests continue to show excellent stability of meter calibration —proving that bearing friction remains unchanged.

RESULT: All bearing maintenance is eliminated. The cost of replacing bearings can be saved. The magnetic-suspension system is undoubtedly the only system that offers this service-free performance . . . and the resulting dollar savings.

FOR MORE INFORMATION on the G-E certified I-50 watthour meter, see the color movie, "Accent on Accuracy." Call your nearest G-E representative or write General Electric Co., Section 601-96, Schenectady 5, N. Y.

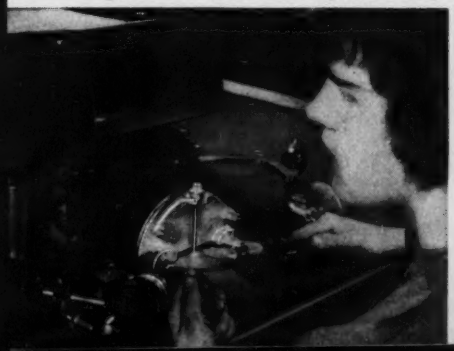
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

GENERAL ELECTRIC

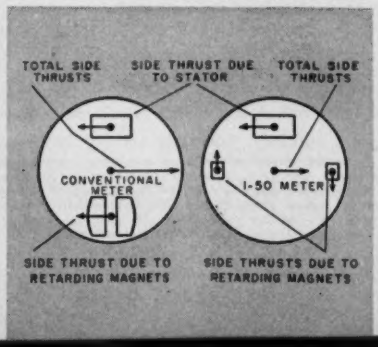


MAGNETIC SUSPENSION eliminates all vertical bearing pressures. Alignment is provided by resilient steel guide pins.

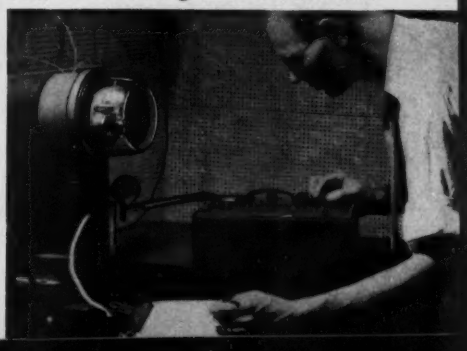
ROTOR is accurately set with this projection equipment. Stable suspension magnets maintain this high accuracy.



RETARDING MAGNETS are positioned to reduce side thrust. Total pressure is 1/2000 of that in jeweled-bearings.



NOISE TESTS prove that the I-50 is quieter than any other meter—another benefit of "floating disk" construction.



APRIL 1953

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-fifth year of publication

VOL. 110 NO. 4

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Associate Editor — John Coatz, Typography

Next Month

May is the issue for our perennial piece on snow surveys and water outlook for the Western slopes as compiled by the Soil Conservation Service. Supplementing the piece this year will be a picture page showing the aerial survey technique used by Southern California Edison Co.

Of considerable timeliness will be an article on television interference drawn from experience in the San Francisco Bay region. About every association meeting program this spring has had TV interference on the agenda and our article will put much of what will be said in reference form for all to read.

How one utility employed soil stabilization methods to aid in installing steel tower footings and reducing costs will make interesting reading.

Lighting of vehicular tunnels is a problem that has seen new developments in recent years. The latest job in the West is the new Broadway tunnel in San Francisco and that installation will be described. Industrial power men will be interested in an article on shell molding, a process that bids fair to revolutionize foundry practice.

Contained in the May issue also will be reports and pictures on no less than six important industry association meetings, besides news letters and other regular features.

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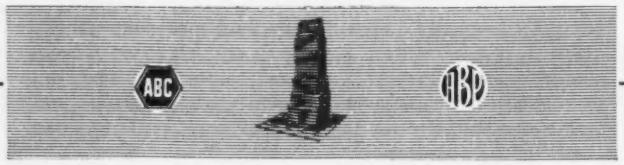

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Completely hook-stick operated. Fuse cartridge can be removed or replaced with standard head switch stick.

L-M's Type HXO Power Fuse Cutout Interrupts up to 20,000 Amperes

Double-Venting: replaceable fuse link button closes top of tube; on low-amperage faults, the tube vents at bottom only; on high faults, pressure releases button at top, giving double-venting. This insures successful interruptions on both low and high fault currents.

Rated at 200 amperes, with interrupting capacities as follows:

20,000 amps at 7.5 kv
15,000 amps at 15 kv
9,000 amps at 23 kv
5,000 amps at 34.5 kv
4,000 amps at 46 kv

These interrupting capacities apply for full range of fuse link sizes from 1 ampere through 200 amperes.

Replaceable Power Fuse Link

Field-replaceable E-rated power fuse links, similar in design and construction to those used in distribution cutouts. No cartridges to replace, no filler tubes to buy. Designed for positive corona-free operation at high currents and voltages. Ratings and performance meet NEMA Power Fuse Standards.

L-M Power Fuse Links cost only $2.60 each (smaller sizes $1.60) compared to other cutouts requiring complete cartridges at $10 or more. Sizes from 1 to 200 amperes.

Get Full Information on the HXO

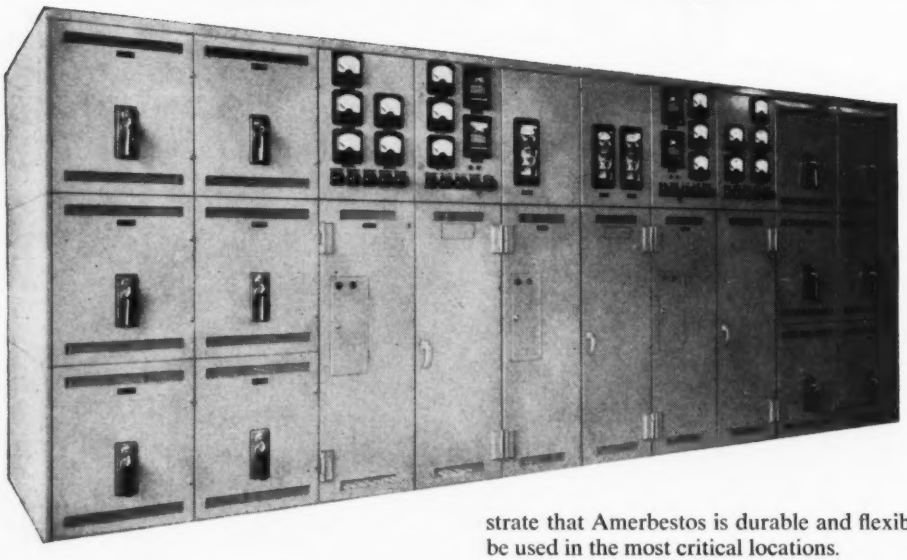
Ask the L-M Field Engineer for details and bulletin, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL

fuse cutouts

117

"We've got to have a and we're getting



I-T-E says, "Our switchgear goes into central power plants that serve entire cities. The failure of *one wire* could shut down a million-dollar turbine and cause a total power blackout. Process plants could lose millions in ruined products and interrupted production. The stakes are too high for us to use anything but a top quality wire, and we're getting it with Amerbestos."

For the switchgear shown here, I-T-E uses U·S·S Amerbestos 90C type TA: copper strand—thermoplastic insulation—felted asbestos—flame-resistant cotton braid. The homogeneous thermoplastic insulation gives excellent moisture protection; and, even more important to I-T-E, it can be bent to a much shorter radius than helically-wound insulations. As a matter of fact, I-T-E found that after a bending test, this type of Amerbestos construction could withstand a breakdown voltage *20 to 30 times* higher than helically-wound insulations. While this was an unusually severe test, it does demonstrate that Amerbestos is durable and flexible enough to be used in the most critical locations.

Since the very reputation of I-T-E is built upon the high quality of their product, they demand close quality control from suppliers, too. "And," says I-T-E, "We know that American Steel & Wire checks, tests and inspects every foot of wire we get." I-T-E also remarked that the Amerbestos conductors are always well centered in the insulation, and the thermoplastic insulation shows no tendency to flow or become brittle.

You can get this same high quality from American Steel & Wire no matter what kind of wire or cable you use. Send the coupon and get more information about Amerbestos; or, better still, outline your wire or cable problems and give our engineers a chance to help you.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD Cable for every

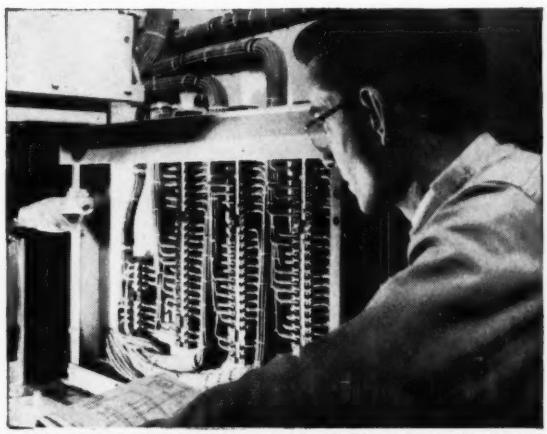
- paper & varnished cambric cable
- asbestos wire and cable
- aerial, underground & submarine cable
- shovel & dredge cable

AMERICAN STEEL & WIRE DIVISION — USS — AMERICAN ELECTRICAL WIRE AND CABLE — UNITED STATES STEEL

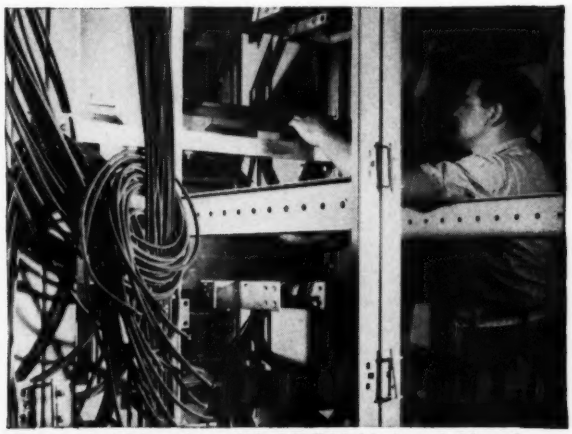
U·S·S AMERICAN ELECTRICAL

top quality wire it with Amerbestos"

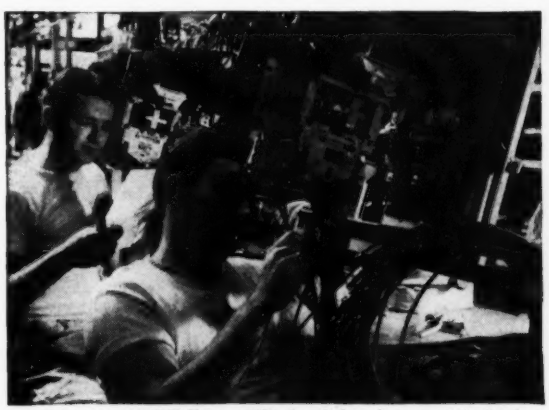
says I-T-E Circuit Breaker Co., Inc., *world-famous switchgear manufacturer*



THIS LOW-VOLTAGE BOILER control switchboard contains 22,000 feet of Amerbestos. It has 11 circuit breakers, is being built for Astoria, N. Y. generating station of Consolidated Edison.



HERE, an electrician wires a 600v I-T-E Multimite switchboard. It has 9 compartments, 7 for circuit breakers, 2 for instruments. Notice extreme flexibility of the Amerbestos wire.



EACH OF THESE I-T-E type KB circuit breakers contain 22 feet of Amerbestos. In this photograph, workmen are wiring the circuit breakers up to the terminal blocks.

UPPER SECTION of this photo is the main power bus on the Consolidated Edison switchboard. Wiring duct cover has been removed to show the 298 wires that occupy the compartment.

SPECIAL Job!

- **mold cured portable cord**
- **machine tool & building wire**
- **special purpose wire & cable**

SEND THE COUPON

American Steel & Wire Division
Room JE-43, Rockefeller Building
Cleveland 13, Ohio

☐ **Please give me more information about Amerbestos**

☐ **I'd like to talk to your representative**

Name .....

Firm .....

Address .....

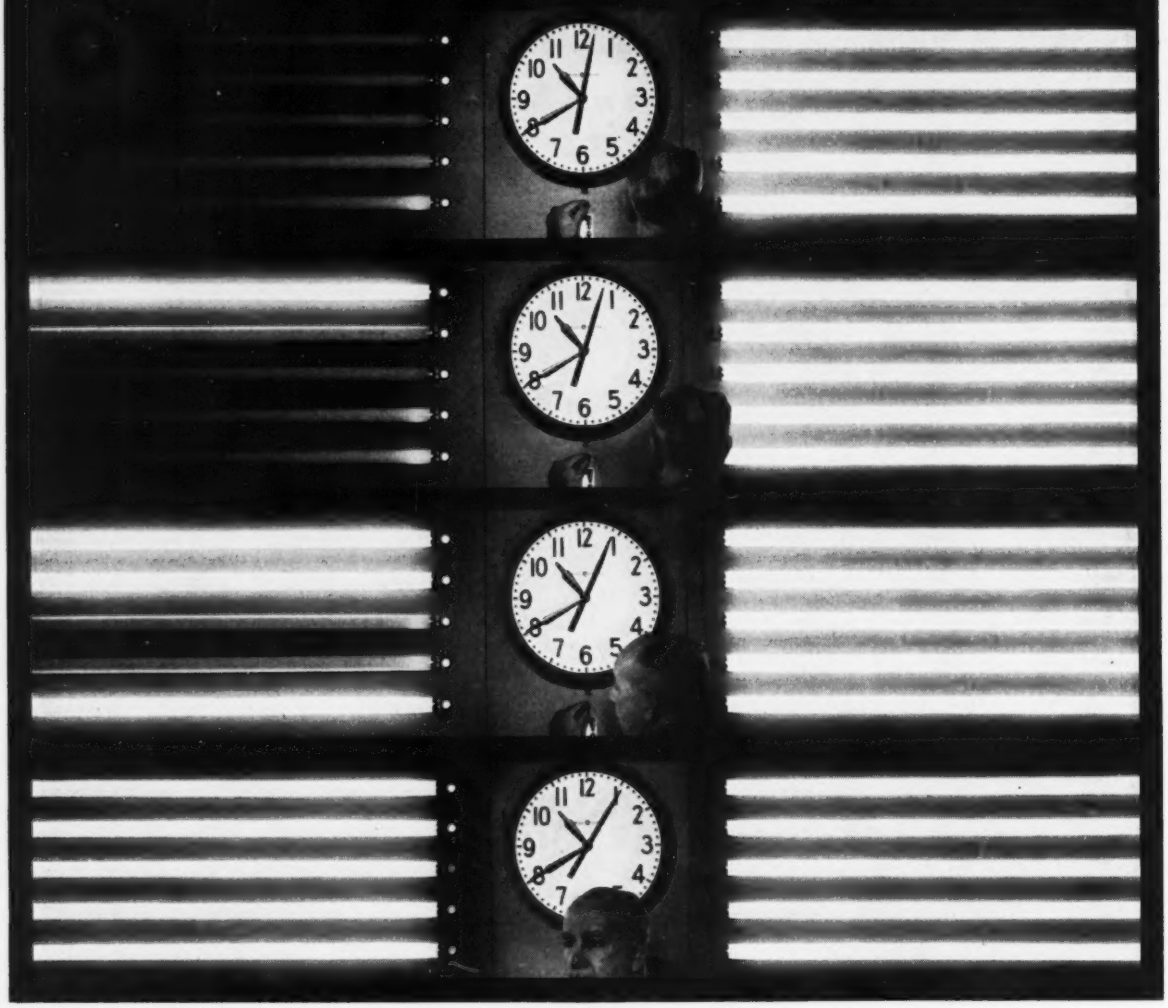
City ..... **State** .....

WIRE & CABLE

USS

UNITED STATES STEEL

You expect the best value from G-E fluorescent lamps



Above are four unretouched photos taken about one second apart. The lamps on the left are regular fluorescent lamps. Those on the right are new General Electric *Rapid Start* fluorescent lamps. All were started at the same instant.

Within two seconds, all five G-E *Rapid Start* lamps are fully lighted. The regular lamps are only beginning to light.

The G-E *Rapid Start* lamp eliminates the starter, required to pre-heat regular lamps. Starting is almost instantaneous, maintenance is simpler, cheaper.

Two new General Electric developments made the *Rapid Start* lamp possible: a triple-coil cathode that holds more starting chemical and a *Rapid Start* ballast that pre-heats the lamp automatically.

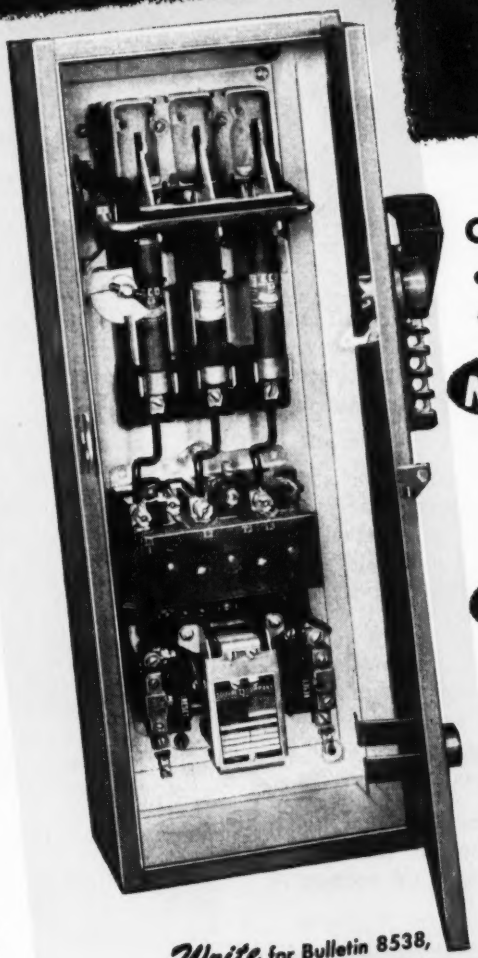
General Electric *Rapid Start* lamps and ballasts are now available. They're another reason why you can *expect* the best value from G-E fluorescent lamps. For free folder, "Facts About Rapid Start", write General Electric, Dept. 166-WE-4, Nela Park, Cleveland 12, Ohio.

New G-E fluorescent lamp starts quicker, needs no starter

You can put your confidence in—

GENERAL ELECTRIC

DESIGN LEADERSHIP



THIS NEW SQUARE D COMBINATION STARTER (SWITCH TYPE) offers Greater Operator Safety and Longer Motor Starter Life

NEW ***Switch Operating Mechanism*** provides maximum operator safety. Interlock prevents opening door when disconnect is on. When door is re-closed, self-aligning handle indicates true position of disconnect. Operating handle can be locked in the OFF position with one, two, three or four padlocks of varying sizes. Handle-locking mechanism also locks door.

NEW ***Switch Design*** has quick make and quick break action—no dead center—visible blades for easy checking—magnetic arc plate for high rupturing capacity—dead-front line terminals, protected by hinged arc chamber cover—positive pressure jaws and fuse clips—non-tracking insulation.

NEW ***Features in Magnetic Starter Design*** Square D's time-proven design has always provided easy installation, simple maintenance, and long life. Now, even longer life is assured by straight line, guided motion of armature and movable contact assembly which eliminates bearing and reduces wear. For added convenience and flexibility, Square D starters now have NEMA standard mounting and wiring.

Write for Bulletin 8538, SQUARE D. COMPANY, 4335 Valley Boulevard, Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Watch for Square D's Display Coach—Now on Tour!

DON'T WIND UP BEHIND THE

You can't be too particular what kind of wire and cable you buy. Lack of quality invites trouble. Trouble that brings unnecessary shutdowns, rising costs, and lower production rates. Why then get substitutes when you can install Simplex-Anhydroprene, the top quality wire and cable that assures you of longer-life and trouble-saving service.

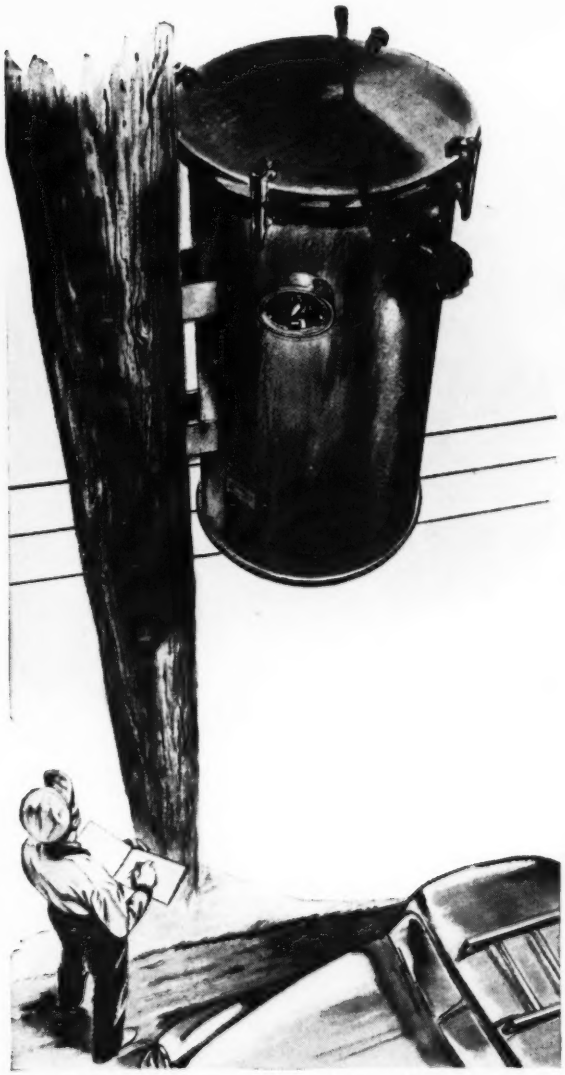
Anhydroprene construction consists of a solid or stranded coated conductor, Anhydrex insulation, and a thin neoprene jacket. Light in weight and small in diameter, it is easy to handle and terminate. Anhydroprene resists oil, grease, corrosive chemicals, light and flame. With a high dielectric strength and low water absorption, this versatile wire operates at copper temperatures up to 167°F. (75°C.).

Designed for a variety of applications, Anhydroprene assures you of increased operating efficiency. All Anhydroprene wires and cables can be racked on walls, installed in conduits and used underground in ducts for plant and shop wiring, instrument wiring, underground primaries, transformer leads, pole line risers, signal and control circuits.

Why not call your Simplex representative or write in care of the address below for more complete information on the electrical and physical properties of Anhydroprene. No obligation of course.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.



Better load records . . . lower cost! Safer and easier, too. No need to climb for ammeter checks. No guessing about overloads. Dial can be read from the ground.

New overload indicator takes "guess" and "work" out of load surveys

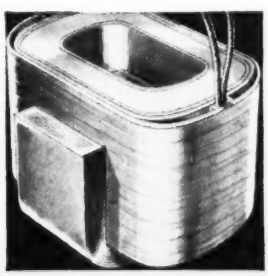
It flashes a warning . . . and counts overloads, too!

The new Westinghouse Type "PL" Overload Indicator eliminates load-check climbing, puts an end to guesswork about overloads, and does it more accurately than any comparable device.

The red light tells that the transformer is now or has been overloaded. The dial completes the story, telling *how many times.* Since the indicator is operated by a thermostat embedded in the coil, indication is highly accurate because it is a direct reaction to copper temperature.

On each of the first four overloads, whether they're hours, days or months apart, the warning signal lights. It then goes out automatically as the overload passes, but the dial shows the number experienced. On the fifth overload, the signal light locks on as a continuous warning of the serious condition. The dial records consecutive overloads up to 28...far more than should occur before change-out. A pushbutton is provided at the base of the dial to clear the indicator for a new load-checking cycle.

Developed as the result of years of co-operation with utilities to determine the most useful type of overload indication, the Westinghouse Type "PL" Indicator opens the way to more accurate load records than ever before possible . . . at a fraction of the time and expense. Available on all conventional models of Westinghouse Single-Phase Distribution Transformers, 3 through 167 kva, 15,000 volts and below. Your Westinghouse representative will be glad to give you further information, or write direct to Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70669-A



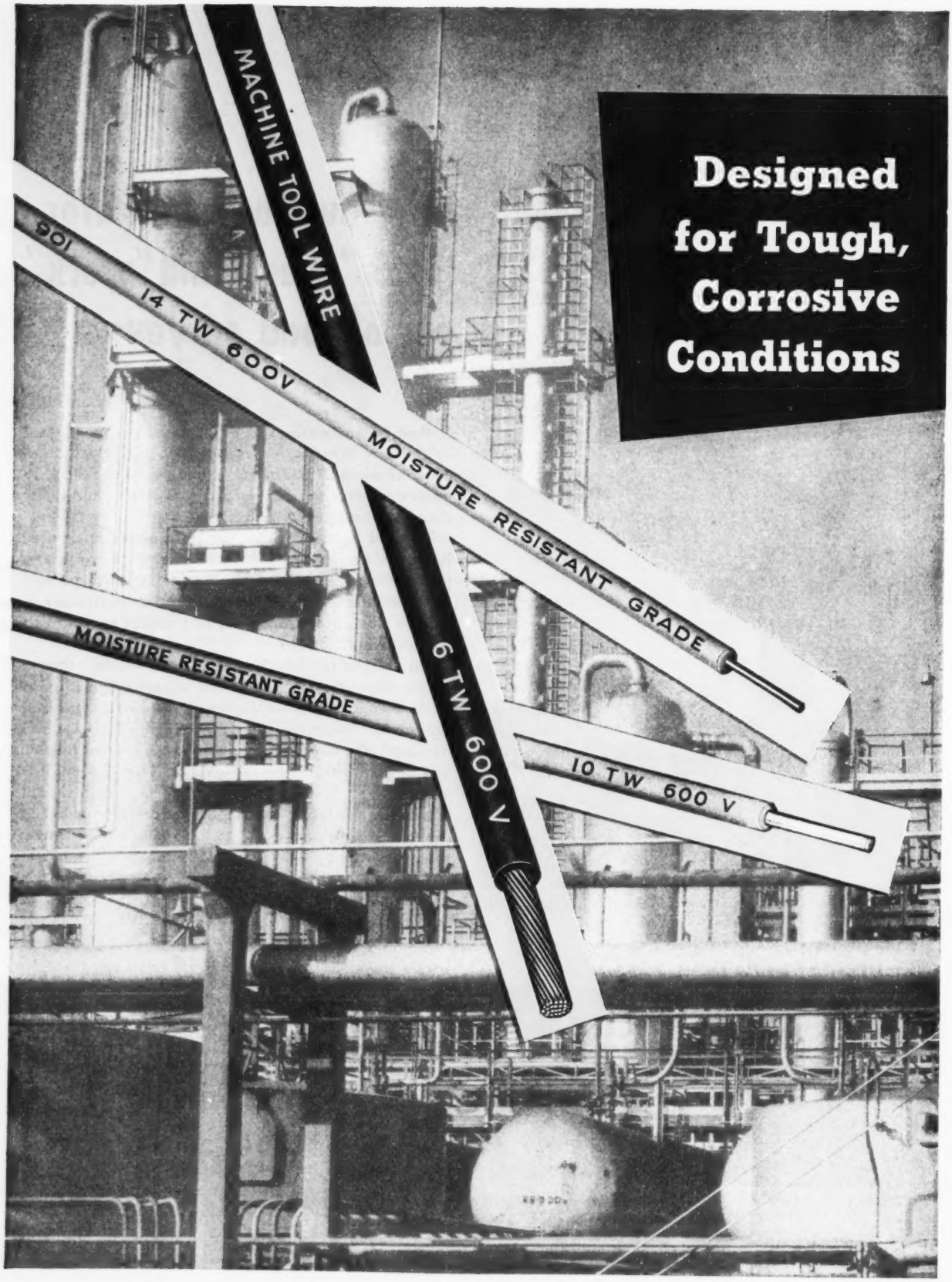
Highest possible accuracy! The Westinghouse Type "PL" Overload Indicator is operated by a thermostat embedded in the transformer coil, where it reacts directly to copper temperature.

Warning...overworked transformer! The red light shows overload condition; the pointer indicates how many times this has happened. Reset button may be used to return the pointer to zero.

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver


MACHINE TOOL WIRE
901
14 TW 600V
MOISTURE RESISTANT GRADE
MOISTURE RESISTANT GRADE
6 TW 600 V
10 TW 600 V
Designed for Tough, Corrosive Conditions

Rome Synthinol®

WIRES AND CABLES

Whenever you are selling or installing plant wiring, you'll find Rome Synthinol thermoplastic insulated wires and cables are sure to build your reputation for handling quality products. They are manufactured to withstand tough, corrosive conditions like those encountered in the chemical or petroleum industries.

This rugged, polyvinyl chloride type insulation has proven its ability to resist acids, moisture, abrasions, corrosive fumes, flame, oils and cutting solutions. Colors remain permanently clear for quick, easy circuit identification.

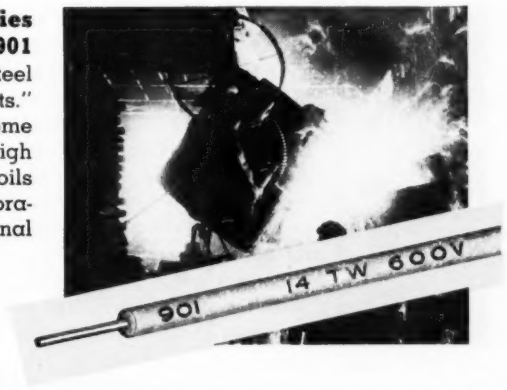
What's more, Rome Synthinol assures quick, easy, economical installation. Its lubricated surface makes it easy to pull. It's easy to strip, too. And, its small diameter, high dielectric strength and exceptional aging characteristics make it ideal for industrial wiring circuits.

Rome Synthinol, Type TW small diameter building wire is approved by the Underwriters' Laboratories for use in wet locations under the rules of the National Electrical Code.

Rome Synthinol Machine Tool and Control Wire has been adopted as standard wiring material by machine tool manufacturers for extreme durability and excellent resistance to heat, oils, acids, alkalies, common cutting solvents, etc. Underwriters' Laboratories approved as Type TW, with end use approval for 80° C. operation in air; 60° C. where exposed to oil and in wet locations. Conforms with National Machine Tool Builders' Assoc. Standards.

For Steel Mills, Chemical Plants, Oil Refineries and Other "Hot Spots" . . . Rome Synthinol 901

Here's the ideal insulation for the equipment wiring of steel mills, chemical plants, oil refineries and other "hot spots." A heat resistant polyvinyl chloride type of insulation, Rome Synthinol 901 provides superior service life under high operating temperatures. It also offers high resistance to oils and chemicals. It is approved by Underwriters' Laboratories as Type TW, for 60°C. operation under National Electrical Code.



Superior Rome wires and cables and famous Rome • EMT are stocked at the following Western Warehouse locations:

San Francisco, Calif.	Denver, Colo.	Seattle, Wash.
Chicago, Ill.	East Los Angeles, Calif.	St. Paul, Minn.
Dallas, Texas	Salt Lake City, Utah	Torrance, Calif.

It Costs Less to Buy the Best

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

ROME CABLE CORP., Dept. WE-4, Rome, N. Y.
Please send me information on Rome Synthinol and Rome Synthinol 901.

Name.....

Company.....

Address.....

City..... *State*.....

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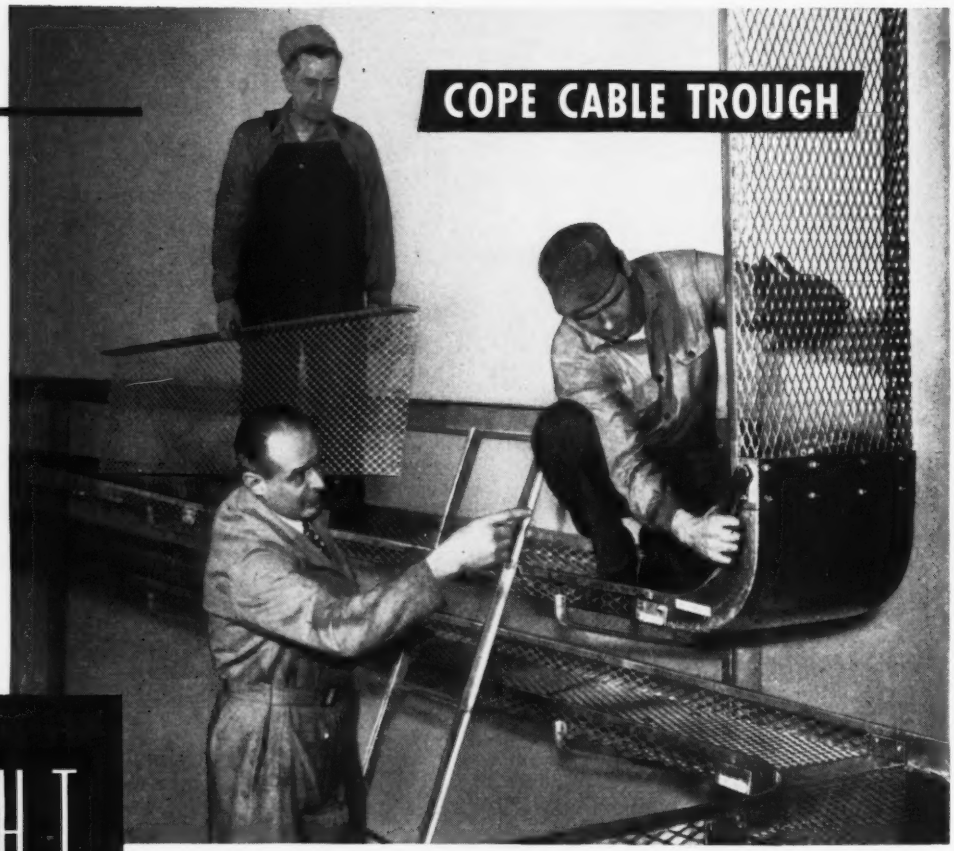

LIGHT ....BUT STRONG!

Here is a graphic demonstration of three of the many features of Cope Cable Trough. Note the ease with which a section is held by one hand. Observe, too, how the trough supports the two workmen as well as the ladder on which the foreman is standing. Its great Strength combined with Lightness make for easier, faster installation and permanent alignment even when filled with cable. There's no sagging to mar the general appearance or to invite wear of the cable.

Cope Cable Trough is of standardized construction for greatest economy yet versatile enough to meet any individual requirement. As the photograph shows, standard Cope fittings allow for turns, branches and changes in elevation.

Many successful installations in leading utilities and industrial plants are proof of its advantages. Many of these installations are on the West Coast. Write any of the representatives listed below for full information.

T. J. Cope INC.

You know Cope by these products

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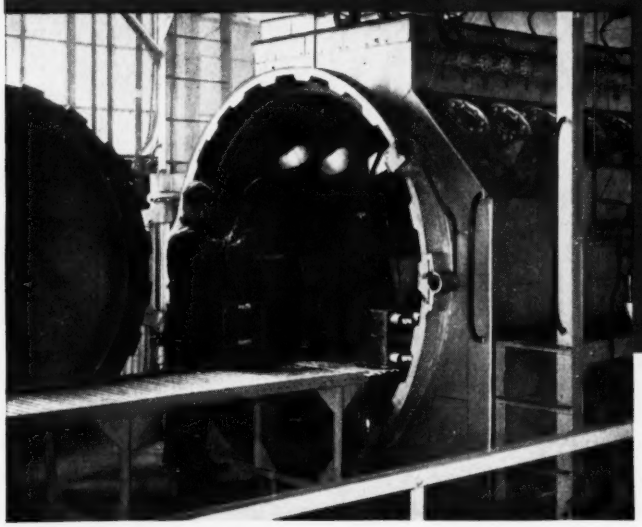
Get all 4 advantages



ALLIS-CHALMERS
INSTRUMENT TRANSFORMERS

1. *Insulation completely protected against air and moisture*
2. *No insulating liquids to maintain*
3. *No leakage — simplified storage and handling*
4. *High dielectric strength*

VACUUM-PRESSURE PROCESS ADDS YEARS TO INSTRUMENT TRANSFORMER LIFE. In the chamber shown above, Allis-Chalmers vacuum-pressure compound-filling process makes the core and coil assembly and its insulation a solid, compact unit within its case. As a result, insulation is completely protected against outside air and moisture. High dielectric strength is assured. And transformer maintenance is greatly reduced.

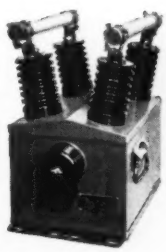
HERE'S HOW IT'S DONE

Two steps do the job. First, a combination of high vacuum and heat drive moisture from the core and coil assembly. Then, while the vacuum is maintained, the case is filled with hot compound which is chemically stable and free of absorbed gases and impurities. This draws hot compound into the innermost parts of the assembly, preventing local ionization and extending normal insulation life.

ELIMINATES PERIODIC TESTING

Since compound-filling eliminates insulating liquids, periodic inspections can be reduced. There is no need for filtering or testing liquids. Storage and handling are simplified because there is nothing to leak out. It is easy to see why you save money and trouble. Why not call your nearby A-C district office today and get more information. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Outdoor current transformers, Type KO, rated up to 15 kv and 1800 amp.



Indoor potential transformers, Type PD, rated up to 14,400 volts, 200 va, fused or unfused.

Outdoor potential transformers, Type PWD, rated up to 15 kv, 200 va.

A-3978

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WE'VE HAD TO EXPAND!

And now we have not one or two

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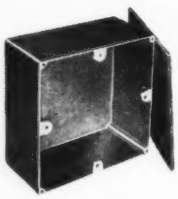
cast iron boxes like our types YS  and YE

Everybody wants them

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Of course, increased production

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Write for your new price list today!

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PLASTIC INSULATING TAPE
with the heat- and oil-resistance of Temflex® 105 Tubing

Here is a new addition to the Irvington family of insulating tapes—Temflex 105 Plastic Tape, based on the *same* formula that has made Temflex 105 Tubing the leader where service calls for continuous operation in air at 105° C.—or in oil at 90° C.

Temflex 105 Tape is strong and flexible—possesses exceptional elongation. It can be easily hand wound over bus bars, coils, cables—even over very irregular surfaces—or can be used in taping heads. Temflex 105 Tape frequently offers substantial savings as compared with varnished cambric. Easily baked to a homogeneous mass, it also offers cost economies over pressure-sensitive tapes.

Made in thicknesses of .007", .010" and .012"; widths from ½" to 34". Dielectric strength as high as 1200 vpm *even at 100° C.* Tensile strengths up to 3100 psi—elongation 165% to 240%.

Look to
IRVINGTON
for Insulation Leadership

INSULATING VARNISHES
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INSULATING TUBING
CLASS "H" INSULATION

You probably know Temflex 105 *Tubing*—you'll certainly want to learn about Temflex 105 *Tape*. Mail the coupon for technical data sheet.

Send this convenient coupon now

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Irvington Varnish & Insulator Company
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Gentlemen:

Please send me technical data sheet on your new Temflex 105 Tape.

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Company.....

Street.....

City.....Zone.....State.....

EW 4/53

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TRANSFORMERS
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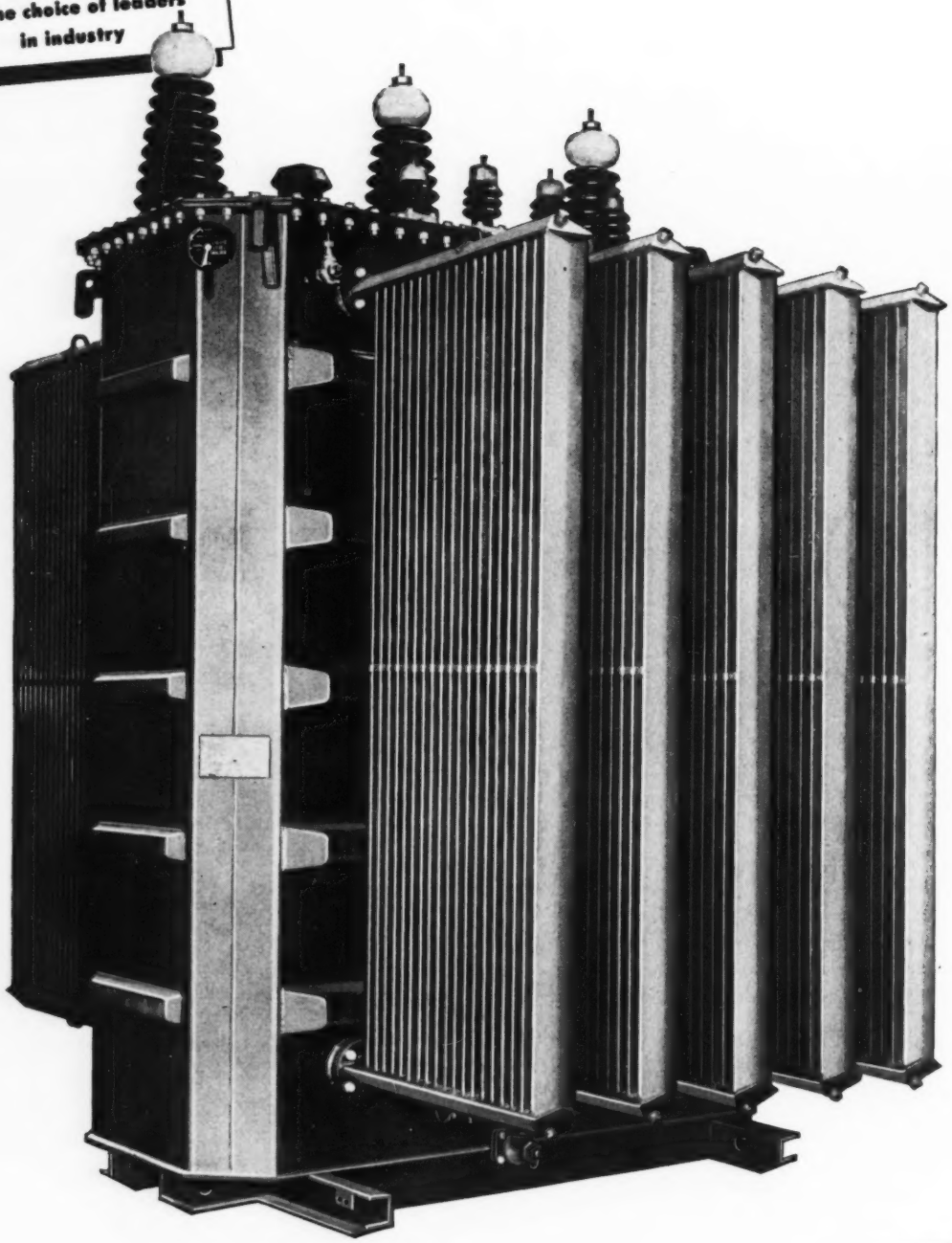

® Wagner Electric Corporation
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T53-3

Wagner Power Transformers Meet ASA C57.12a Standards

give you Wagner quality and dependability at reduced cost

When you need power transformers, why not check ASA C57.12a Standards and use them as your specifications on all your requirements for 10,000 kva and below—three phase...and 5,000 kva and below —single phase ratings. In addition to saving the cost of preparing your specifications, you will also realize a substantial saving in price by using Wagner Standard Transformers.

Wagner Power Transformers have been serving the power industry dependably for over sixty years. Service records from the field, dating back to the early days, prove their ability to give continuous service over unusually long periods of time. They are compact in design and are built with painstaking care to give them inherent strength and stability. They have sufficient capacity not only to carry their normal load, but to be able to handle overloads—again and again—whenever emergencies arise.

Why not consider Wagner Standard Power Transformers for your next installation? Get full information from your nearby Wagner engineer (there are Wagner branch offices in 32 principal cities)—or write us.

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6381 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

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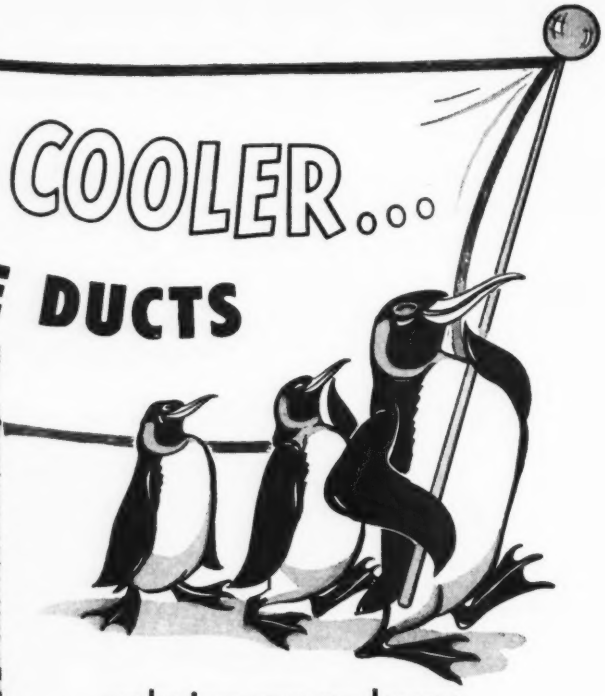
Cables run COOLER...
in TRANSITE DUCTS



... reducing copper losses
... increasing current capacity
... prolonging insulation life

YOU REDUCE copper losses... increase current carrying capacity... and prolong insulation life, when you run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 60, New York 16, N. Y.

JM

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV
(6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric loss (C)	1.9	2.1
Allowable Rise for Copper loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts*

TRANSITE KORDUCT— for installation in concrete

TRANSITE CONDUIT— for exposed work and installation underground without a concrete encasement

Solid-Silver to Solid-Silver Roller-Wipe Contacts . . .

on PACIFIC ELECTRIC

Types SW and SWA
Pole Top

AIR SWITCHES

These contacts in advanced form are used on Pacific Types SW and SWA Air Switches because they assure maximum reliability and minimum cost of upkeep.

The Type SW is similar, but has three insulators.

7.5 to 46 kv
400 and 600 amp
(Other Types 7.5 to 230 kv)

AIEE, ASA, and NEMA STANDARD

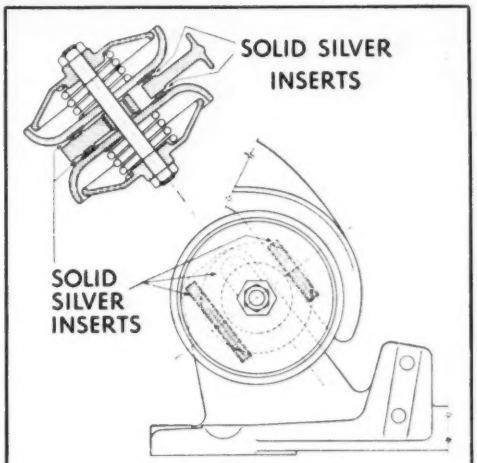
Type SWA 23-kv, 600-amp Switch Unit (a complete switch comprises three such units, operating mechanism, and usual accessories).

DURING PACIFIC'S 46 years of manufacturing air switches* numerous contact materials have been used, and applied in various ways. Unmistakably this experience points to thick silver inserts, silver-brazed to body and blade, as best meeting today's requirements—provided contact pressure is maintained between 50 and 90 lbs. Data in support of this are in Publication DS 195, "Design of Air Switch Contacts for Maximum Performance," mailed on request.

But it is not enough that suitable contact materials be used; the mechanical design must provide cool operation, low millivolt drop, low operating effort, minimum wear, and ample thermal capacity to absorb heat from short-time rated currents (15,600 to 40,000 amp for a 600-amp switch, depending on conditions). Adjustments also should be non-critical and capable of being made with a hot stick, if required.

Pacific Types SW and SWA Pole Top Air Switches generously meet these exacting requirements, and what is more important—maintain these qualities through years of non-use or years of frequent switching, as the other extreme. Catalog 114 describes all features of these switches.

* Pacific is credited with having made the first commercially used tilting-insulator air switch; it was introduced 40 years ago.



Current flows from body of blade through two roller disks that revolve slightly at each switch operation. During opening the roller assembly moves outward one inch before contacts start to part—an aid to progressive fracturing of ice.

All contact surfaces are faced with thick solid-silver inserts.

PACIFIC ELECTRIC MFG. CORPORATION

5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA
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Since 1906

SALES OFFICES or AGENCIES in PRINCIPAL CITIES

Clarence Springer introduces you to--

BUILDING BIG BUSHINGS is a small part of Clarence Springer's job. His major job . . . the job that takes most of his time and ability . . . is seeing to it that Locke insulators remain well ahead of the field . . . in efficiency of product design . . . and reliable performance. With men of Clarence Springer's experience standing behind the performance characteristics of Locke insulators, is it any wonder that leading utilities prefer them . . . specify Locke at every opportunity!

Designed and built by LOCKE

"...picked for the job," says Clarence, "because of Locke's success with similar projects...and because of its extensive research, test and manufacturing facilities."

"Rarely," says Clarence, "has a manufacturer of electrical porcelain insulators been assigned a job as unusual and exacting as that of designing and building this big, complicated antenna lead-in bushing. To the best of my knowledge," he says, "it's the only bushing of its size and type in existence."

As Clarence tells the story, "Since nothing like it had ever been built before, plenty of original research and development work was required."

"However," says Clarence, "special assignments involving extensive research never seem to bother us. Our big advantage is the fact that our insulation research, test and manufacturing facilities are among the world's finest and largest."

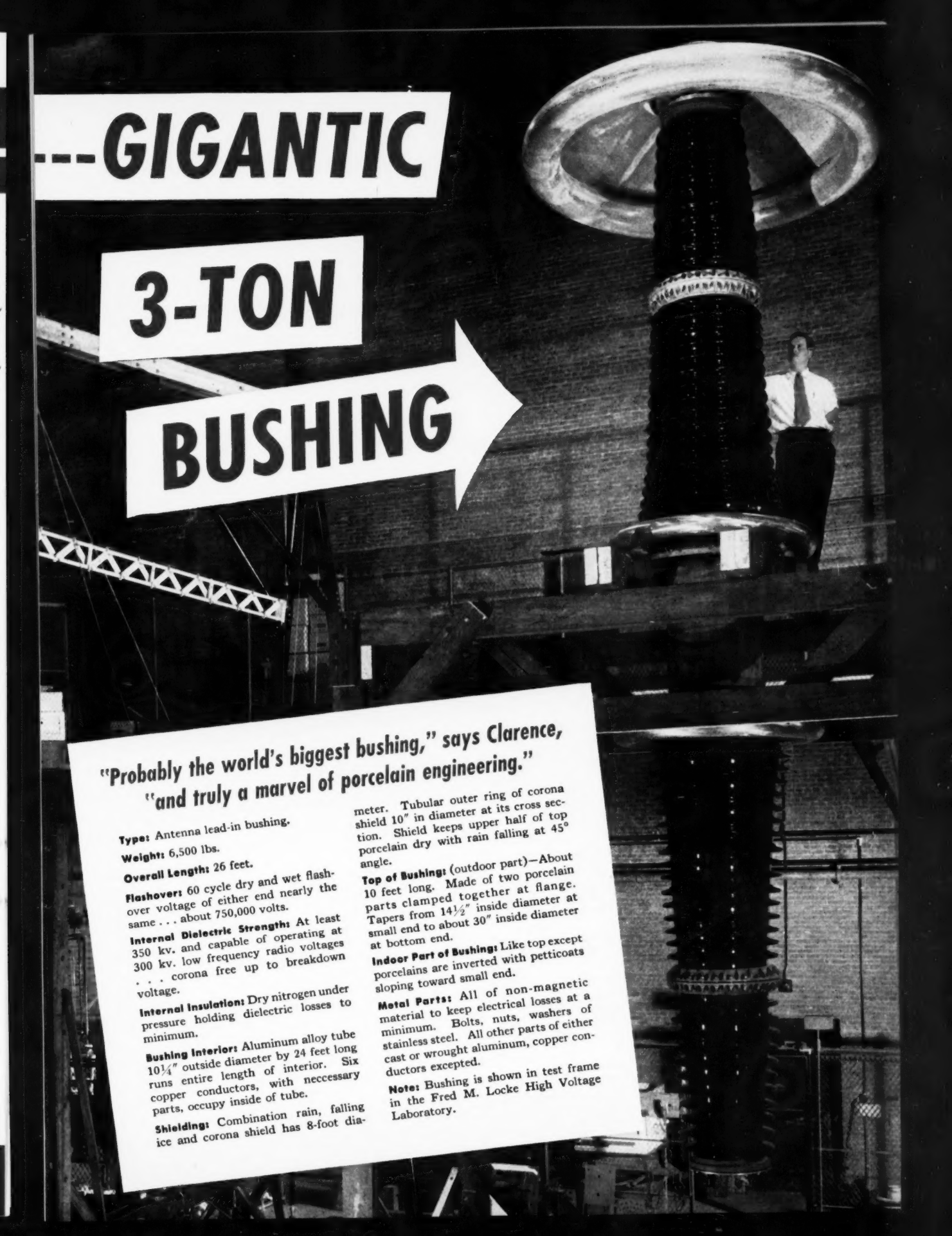
"These facilities give us the tools with which we can lick the toughest kind of problems in porcelain engineering."

"Our success with special projects like this," says Clarence, "must be comforting to users of Locke Suspension, Switch, and Pin Type insulators. As I see it, a fellow can relax when he knows that the same skills, facilities and experience which produced this bushing . . . are always at work building reliable performance into the Locke insulators already on his lines, or on order."

"Leading utilities seem to feel that way about it," observes Clarence. "Judging by the number of insulators going out of here every year, you get the impression that utilities have practically unlimited confidence in Locke insulators. And," adds Clarence, "this confidence is well placed. Utility Service records prove it."

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND



"Probably the world's biggest bushing," says Clarence, "and truly a marvel of porcelain engineering."

Type: Antenna lead-in bushing.

Weight: 6,500 lbs.

Overall Length: 26 feet.

Flashover: 60 cycle dry and wet flashover voltage of either end nearly the same . . . about 750,000 volts.

Internal Dielectric Strength: At least 350 kv. and capable of operating at 300 kv. low frequency radio voltages . . . corona free up to breakdown voltage.

Internal Insulation: Dry nitrogen under pressure holding dielectric losses to minimum.

Bushing Interior: Aluminum alloy tube 10¼" outside diameter by 24 feet long runs entire length of interior. Six copper conductors, with neccessary parts, occupy inside of tube.

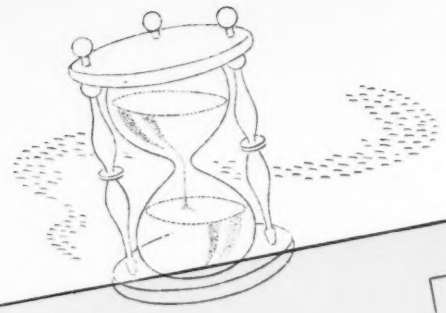
Shielding: Combination rain, falling ice and corona shield has 8-foot diameter. Tubular outer ring of corona shield 10" in diameter at its cross section. Shield keeps upper half of top porcelain dry with rain falling at 45° angle.

Top of Bushing: (outdoor part)—About 10 feet long. Made of two porcelain parts clamped together at flange. Tapers from 14½" inside diameter at small end to about 30" inside diameter at bottom end.

Indoor Part of Bushing: Like top except porcelains are inverted with petticoats sloping toward small end.

Metal Parts: All of non-magnetic material to keep electrical losses at a minimum. Bolts, nuts, washers of stainless steel. All other parts of either cast or wrought aluminum, copper conductors excepted.

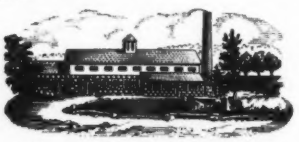
Note: Bushing is shown in test frame in the Fred M. Locke High Voltage Laboratory.



KERITE
CABLE-GRAM

QUALITY IS THE PRODUCT OF INTEGRITY. ALMOST 100 YEARS OF UNFALTERING ADHERENCE TO THE HIGHEST STANDARDS OF MANUFACTURE HAS MADE QUALITY AN INHERENT COMPONENT OF KERITE INSULATED CABLE. ITS DEPENDABLE PERFORMANCE HAS BEEN MEASURED BY TIME, THE ULTIMATE TEST OF ENDURING QUALITY. ITS PROPERTIES, STILL UNRIVALED TODAY, MERIT CONTINUED USER CONFIDENCE.

THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.



1854 KERITE FACTORY 1864

DAYS KERITE

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
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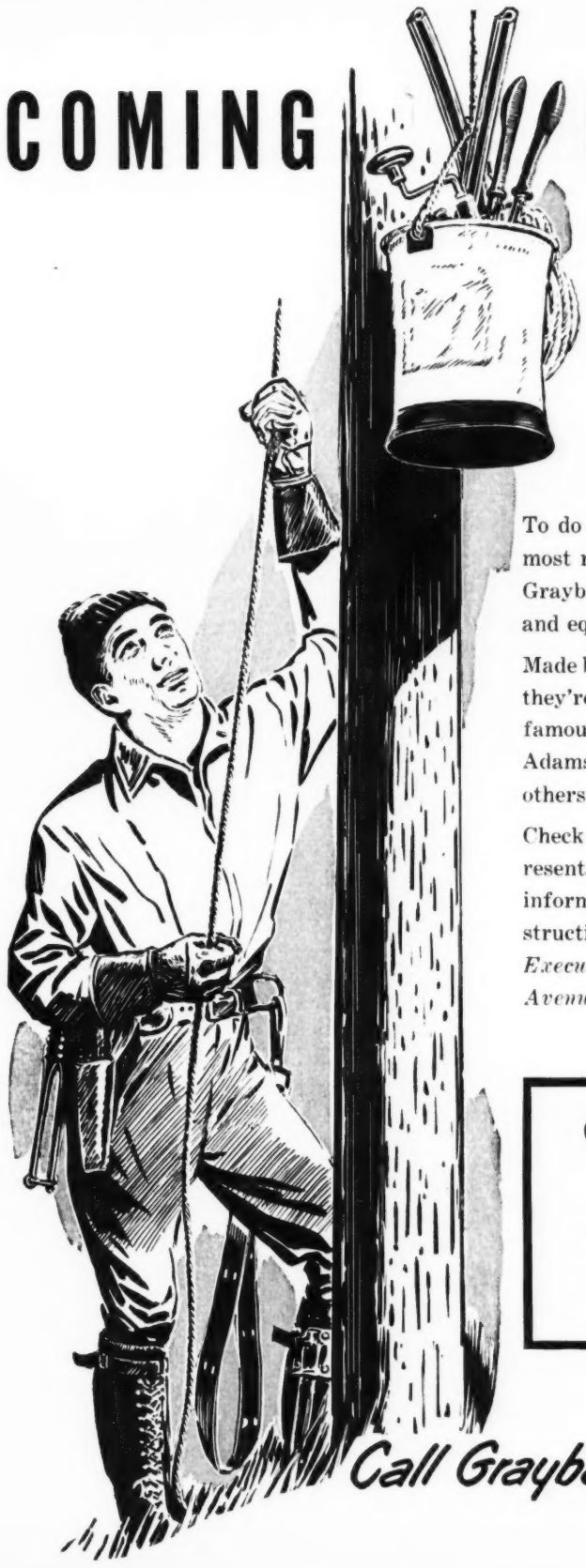
COMING RIGHT UP!



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Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 100 PRINCIPAL CITIES

80 years ~~old~~ young

Age in itself means very little. But age accompanied by historic achievements and age that is continuing to produce the finest products of their type is something of which we are proud.

1873

Founded in 1873, The R. Thomas and Sons Company very early became closely allied to the electrical industry.

1885

In 1885, the first "Thomas Quality" insulator was produced, the first shipment going to the U.S. Electric Lighting Co., Chicago.

1893

In 1893, all of the porcelains used in the lighting arrangement for the World's Fair at Chicago, installed by Westinghouse, were Thomas.

1896

In 1896, Thomas perfected the first multi-part, high-voltage, pin-type insulator. It was known as the "Boch" Glaze-Filled Insulator, later to be patented under No. 600,475. It represented the initial step toward making possible the transmission of electrical energy at higher voltages.

1907

In 1907, Thomas designed and made the first cap-and-pin suspension insulator. Units installed that year are still giving trouble-proof service after 46 years of continuous operation.

1917

In 1917, we introduced the Thomas link-type Hewlett suspension insulators. Insulator failure being virtually unknown with this design, it is easy to understand why hundreds of thousands are still giving satisfactory service today.

1938

In 1938, Thomas engineers pioneered and were first to develop the under-glaze metallic oxide coating that guarantees the "noise-free" operation of the patented Thomas "Q-T" Insulators. (Patent No. 2154387)

These are among the many Thomas "Firsts" and contributions which have helped the Electrical Industry reach its present position.

TODAY, in our 80th year, we are ready with improved facilities and increased capacity to meet the most exacting needs of the Industry. After all is said, it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Why gamble?

The R. Thomas and Sons Co.

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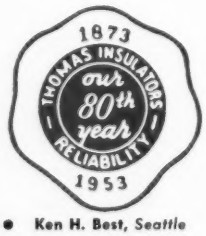
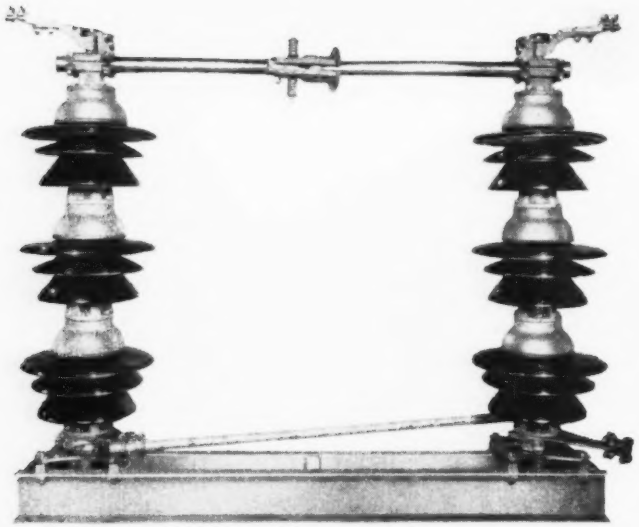


Sales Representatives: **C. G. Anderson,** *Chicago* • **E. B. Anderson Co.,** *Detroit* • **Conrad R. Bangh,** *Omaha* • **Ken H. Best,** *Seattle* **R. E. Cunningham & Son,** *Los Angeles* • **W. H. Eddy Electric Products, Inc.,** *Phoenix* • **Engineer Sales Co.,** *St. Petersburg* • **Electrical Distributors Co.,** *Philadelphia* • **Hamilton Associates,** *Denver* • **Geo. E. Honn Co.,** *San Francisco* • **Hugo Sales Co.,** *Minneapolis* • **John G. Pettijohn Co.,** *Knoxville* • **H. E. Ransford Co.,** *Pittsburgh* • **J. F. Schaefer & Co.,** *Kansas City* • **R. J. Sullivan Co.,** *Boston* • **Tafel Electric & Supply Co.,** *Louisville* • **Walter E. Thompson Co.,** *Birmingham* • **Triangle Electric Supply Co.,** *El Paso* • **United Electric Supply Co.,** *Salt Lake City* **Williamson Sales Co.,** *Shreveport, Amarillo, Corpus Christi, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

1953
Thomas QUALITY
INSULATORS AND
ACCESSORY HARDWARE



SCHWAGER-WOOD TYPE DSB SWITCH

(Illustration is of a 115 KV-600 Ampere Switch)

Group operated horizontal break switch with two rotating insulator stacks per single pole. Ideal switch for conditions demanding low initial cost, ease of installation and minimum maintenance for bypassing, disconnecting and bus sectionalizing. Can be mounted horizontally, vertically or in an inverted position.

SW SCHWAGER-WOOD CORPORATION

PORTLAND, OREGON

High Voltage Switchgear • Substation Design and Equipment • Bus Fittings and Connectors

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TACOMA 2, WASHINGTON
732 Pacific Avenue
Love Electric

Blade tips and contact shoes have heavy brazed-on silver inserts to give silver to silver contact. The self-aligning spherical joints between the blade and the shoe also have heavy silver inserts.

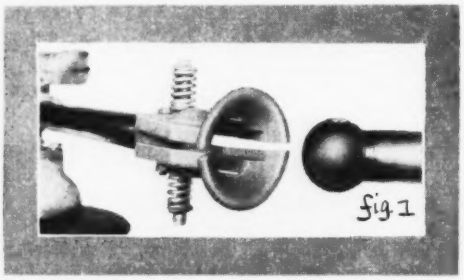


Fig. 1 shows the full tulip type contact assembly.

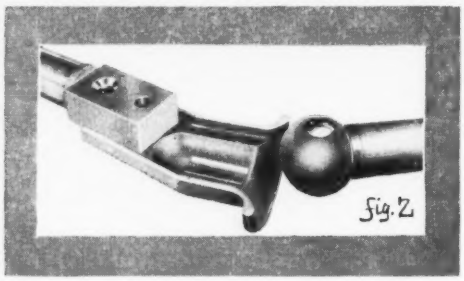


Fig. 2 shows the assembly with top half of the tulip removed.

Schwager-Wood type DSB switches are manufactured in the following ratings:

23 KV to 69 KV — 400 and 600 Amperes.
115 KV and 161 KV — 600 and 1200 Amperes.

COLUMBIA

easy bending . . . easy "fishing"

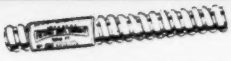
E.M.T.

The smooth, clean inside enamel finish of Columbia E. M. T. makes wire-pulling easy. The galvanized coating prevents corrosion. Every length is thoroughly inspected before shipment—always uniform. Plus, Columbia gives you service that keeps your installations "on-schedule."

Approved by Underwriters Laboratories
Serving the Electrical Wholesaler Since 1912

Columbia CABLE & ELECTRIC CORP.
255 Chestnut St. Brooklyn 8, N. Y.

NON-METALLIC SHEATHED CABLE


FLEXIBLE STEEL CONDUIT

E. M. T.

A.B.C. ARMORED CABLE

Sales Representatives

DALLAS
Olsen-Robertson Co., 2104 Irving Blvd.

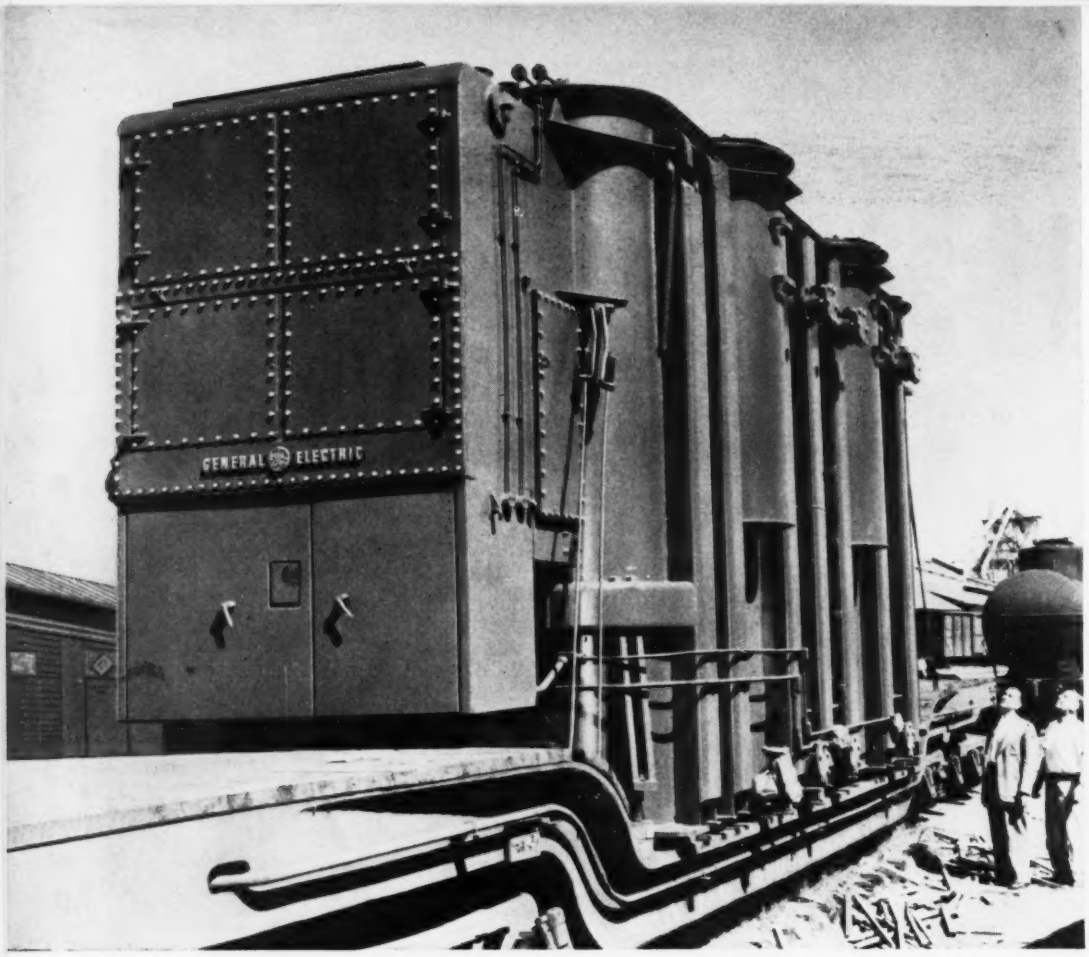
LOS ANGELES
Frank H. Bran Co., 607 E. 6th St.

SAN FRANCISCO
Robert R. Prussia Co., 224-26 Harriet St.

DENVER
Kenneth B. Schumann Co., 1073 Galapago St.

PORTLAND
The Sanderlin Co., 201 S. E. Washington

SEATTLE
The Sanderlin Co., 129 First Ave., West

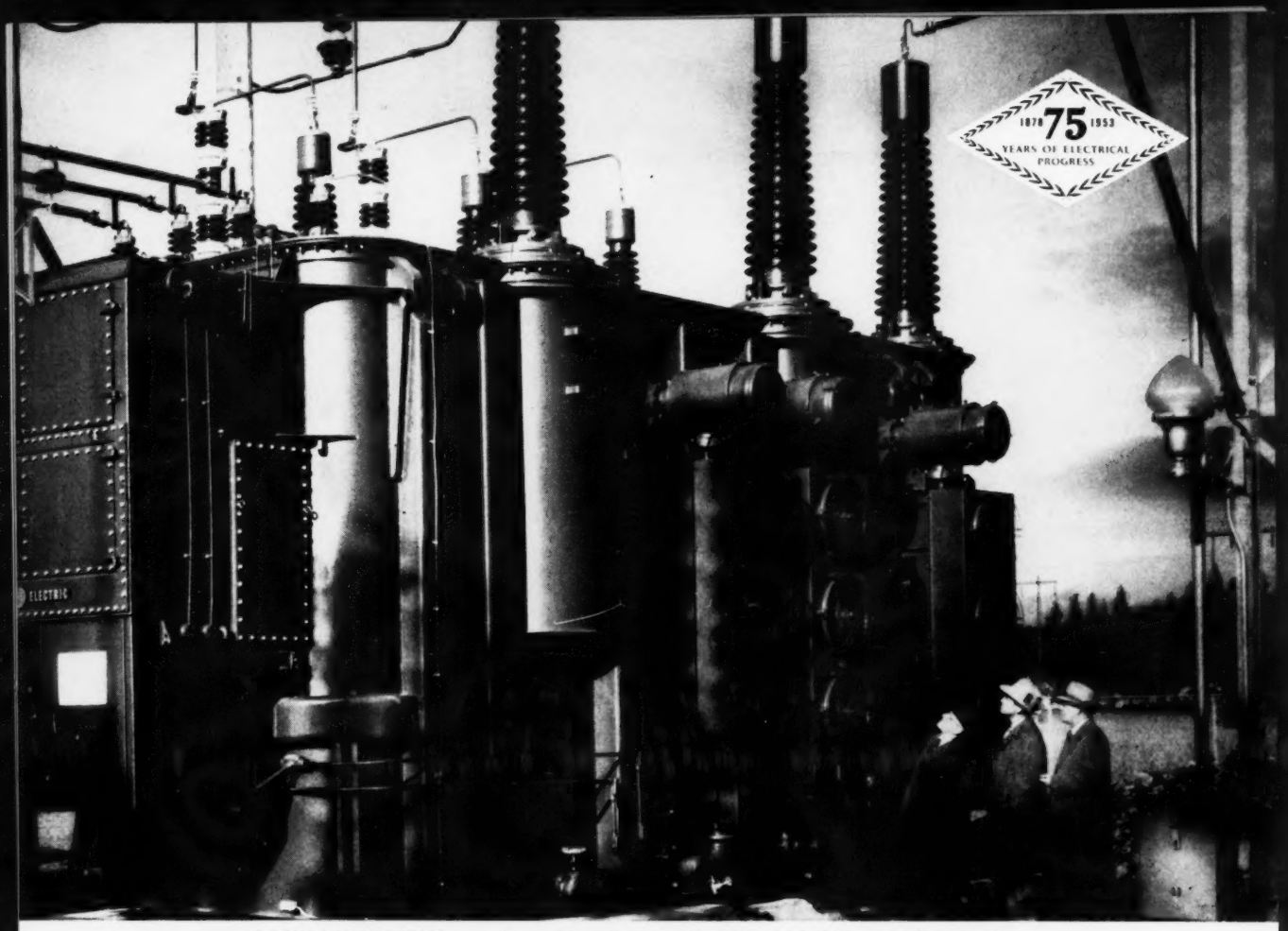


Upright shipment in one-piece tank means you can . . .

INSTALL G-E "CONCENTRIC LAYER"

TRUCK SERVES AS WINCH to transfer the unit from railroad car to trailer for the 2-mile trip to the foundation. Large cranes were eliminated, thus saving time and money.

BUSHINGS WERE INSTALLED just two days after unit was placed on foundation. One-piece tank construction contributed to speed of installation.



8 DAYS AFTER DELIVERY (one day was lost due to rain) this 125,000-kva, 220-kv—115-kv—13.2-kv autotransformer was ready to energize. Unit is cooled by directed flow of forced oil.

TRANSFORMERS FASTER . . . AT LESS COST

Washington Water Power energizes 125,000-kva G-E unit 8 days after delivery

Recently installed at the Beacon Substation of the Washington Water Power Company of Spokane, Washington, this General Electric autotransformer joins a 220-kv line, from the company's new Cabinet Gorge generating station, to an existing 115-kv system. This transformer, one of the largest autotransformers ever installed in the Pacific Northwest, is equipped with plus and minus 5% load-ratio-control. A second identical unit is now being installed and the two units will carry the entire output of Cabinet Gorge.

Reduced weight and dimensions resulting from the use of G-E "concentric layer" high-voltage windings permitted the autotransformer and the load-ratio-control series transformer to be fitted into a one-piece tank and shipped in an upright position.

In addition to their inherent compactness, "concentric layer" windings provide:

- High impulse strength due to uniform distribution of impulse voltages and the elimination of harmful oscillations.
- Effective inter-layer cooling—vertical ducts between layers permit unrestricted oil flow past each conductor.
- Greater mechanical strength because major magnetic forces are radial and well within the tensile strength of the conductor.

If you contemplate systems 161 kv or above in high-capacity ratings, it will pay you to review the data on "concentric layer" transformer design. Ask your G-E Apparatus Sales Representative for Bulletin GER-129, or write to Section 421-1, General Electric Company, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

SOAPSTONE *SUPERIOR* CONDUIT

New Flat-Sided Conduit Simplifies Underground Construction

The picture shows construction work on the first duct system in Northern California to be erected with the new flat-sided SOAPSTONE conduit. This 8-way system was laid in record time by a contractor who had never done underground work before! Engineers and construction men who watched this job were amazed at the time and manpower savings possible with this new design, as well as with the simplicity of erection.

Powerful new extrusion presses make this strong flat-sided conduit possible. Years of underground experience and research have gone into its development. It may be stacked as shown above when no separation between ways is needed. Any spacing desired is easily obtained by use of simple, inexpensive block-type spacers.

Low first cost, less handling on the job and faster laying mean that no extra money is buried underground when you use SOAPSTONE superior conduit.

The smoothest of all conduits, SOAPSTONE is easiest on cables. Rapid heat dissipation, chemical inertness and inherent long life assure permanent circuit protection.

You should have all the information on this new Flat-sided SOAPSTONE. Write or call for prices, specifications and installation details.

MAYDWELL & HARTZELL, INC.

San Francisco — Los Angeles — Phoenix
Portland —Seattle — Spokane

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California — Factory: Oakland, California

PERMANENT CIRCUIT PROTECTION

LETTERS TO THE EDITOR

To the Editor:

In reviewing your article on "Western Utilities Maintain Record Pace of '52" published February 1953, I would like to call your attention to a discrepancy in your listing of completed installations for 1952.

The first unit at Highgrove, capacity 30,000 kw, went on the line May 1952, as indicated by your article. The second unit, 30,000 kw capacity, went on the line July 1952. Adding 30,000 to the 486,000 kw already listed makes a total of 516,000 kw completed during 1952. The listing of the other Highgrove units for 1953 and 1955 is correct.

Allow me to congratulate you on your fine article. It was very complete and covered the subject well.

A. A. LINGO
Superintendent
Highgrove Steam Plant
California Electric Power Co.
Highgrove, Calif.

To the Editor:

We refer you to your article on p 126, January 1953 issue, regarding the English Electric Co. This company does business in the United States through its wholly owned subsidiary, The English Electric Export & Trading Co. Ltd., 23 Beaver St., New York 4, N. Y. We are the latter company's agents for the Pacific Coast. . . .

We would like to commend the ELECTRICAL WEST for its factual news and broad-minded editorial approach to the problem of foreign competition in power equipment.

JAMES I. METCALF
James I. Metcalf & Co. Inc.
Seattle, Wash.

To the Editor:

I was quite amused by "Electra's Husband" in the January 1953 edition of ELECTRICAL WEST. I personally had the "dual control" blanket experience not too long ago, with identical results, the only variation being that I was fortunate enough to find the trouble after the first "hot and cold" night. Maybe the manufacturers should put a "This side up" label on those dual jobs!

I always enjoy this page in your magazine and after reading this particular article couldn't resist writing.

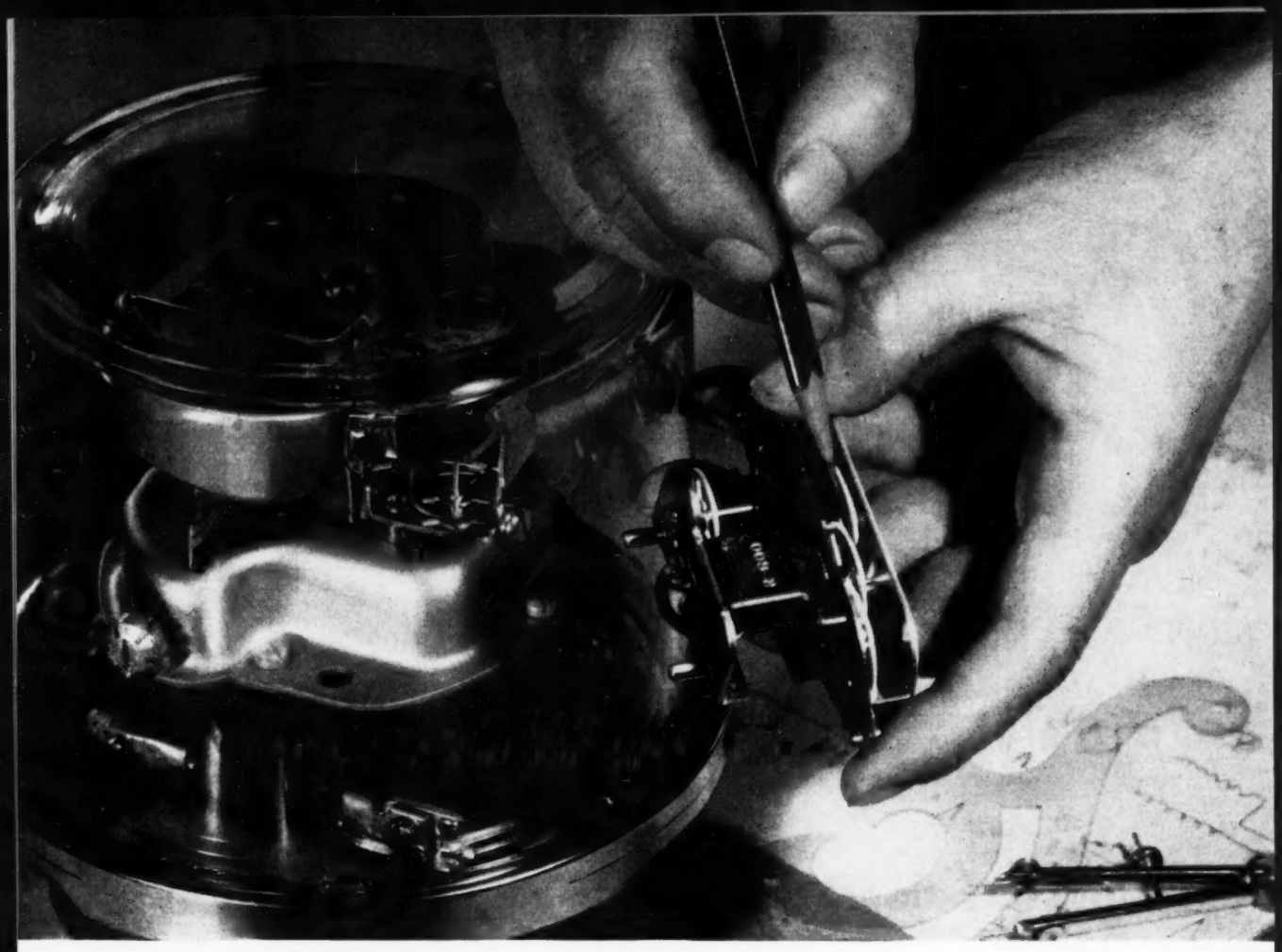
E. F. HOCKENBEAMER
Safety Supervisor
Pacific Gas and Electric Co.
San Francisco, Calif.

To the Editor:

The Kern County Museum is setting up a file of pictures and articles relative to the Kern County earthquakes of July 21 and Aug. 22, 1952. I have been told that an excellent article on earthquake damage from the electrical standpoint was printed in the September or October issue of ELECTRICAL WEST.

I would be most grateful if a copy of this article could be furnished us.

RICHARD C. BAILEY
Assistant Director
Kern County Museum
Bakersfield, Calif.



THE WESTINGHOUSE REGISTER DESIGN

gives you higher sustained accuracy

For long-range sustained accuracy, the register in your meters must be friction-free and corrosion-proof. Only Westinghouse registers have *four important factors* which utility experience has proved are the best guard against corrosion and inaccuracy.

Co-ordinated materials—Gears, shafts, and frame are *brass.* There's no electrolytic action between dissimilar metals to cause corrosion.

Gold plating—The best protection against corrosive atmospheres is gold plating, so that's what Westinghouse applies to all gears and shafts.

Precision machining—Westinghouse gears are precision milled, not just stamped out. The gear teeth have a special involute shape—so that they mesh in a smooth *rolling* action, not a scraping, sliding movement.

Sturdy frame—The frame of this register is scientifically designed to protect all gears and keep moving parts in rigid alignment. The register will withstand a surprising amount of jar and shock without becoming damaged.

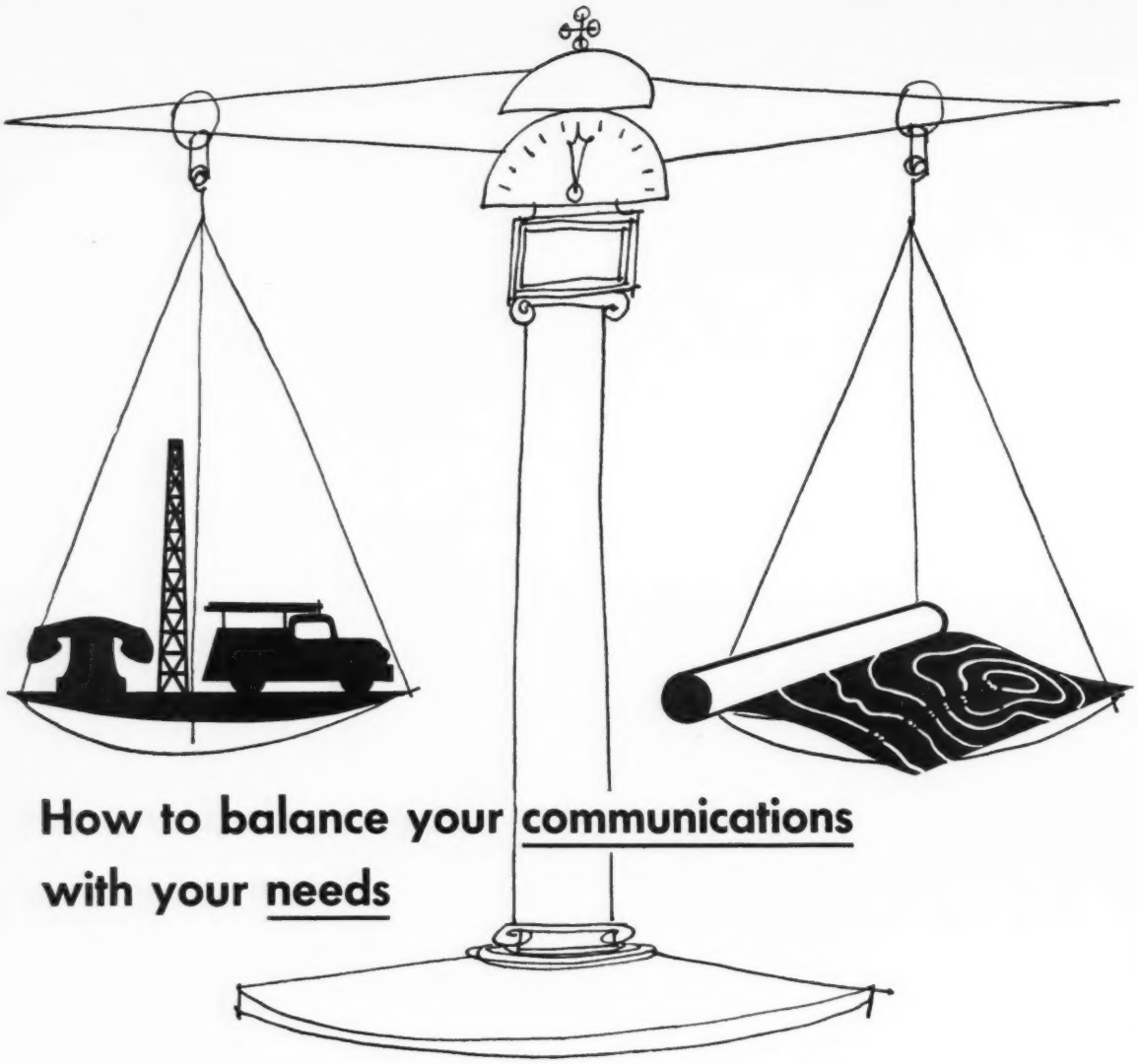
Get more facts—The superior register is one of many important features in Westinghouse meters. Write now for informative booklet B-4665—*What it Takes for Long-Time, Low-Cost Metering*—a 28-page booklet on the important factors in metering. Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-40446

Everything you need in meters and instruments

YOU CAN BE **SURE**...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver



How to balance your communications with your needs

Every power line has its own individual communications requirement. Any less is unsatisfactory. Any more is wasteful.

The Bell System can provide exact amounts of communications service — *no less*, and *no more* than you should have. If your communications needs increase, we can expand your service accordingly. If your needs decrease, we can trim your service to fit.

Net result: *good*, *flexible*, efficient communications for the job at all times.

The Bell System places all forms of communications at your service — using microwave radio, wire or cable. In every case, we have matchless experience to back up our equipment.

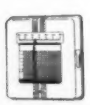
•

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE



METERING CHANNELS

BELL TELEPHONE SYSTEM

ANACONDA FORUM
for the Electrical Industry

THE IMPORTANCE OF
PRODUCTION METHODS ANALYSIS
IN INDUSTRY

by Robert G Ely, Vice President
The Connecticut Light and Power Company

LOWER production costs, always a major concern of industrial management, have, due to inflationary pressures during the past several years, become the vital element of survival in our competitive markets. Fortunately better production methods, coupled with enlightened depreciation practice that provides for prompt replacement of obsolescent productive equipment, enable our industrial customers to stay in the race. And fortunately, America's engineers are past masters at continually developing better production methods. The pioneering work of Dr. Frank Gilbreth in time and motion study laid the groundwork for a fascinating field of engineering encompassing the fundamentals of continued profitable operation in any industrial activity—that of Production Method Analysis.

FROM RAW MATERIAL TO FINISHED PRODUCT

Production Method Analysis studies the operation from raw material to finished product—the method of handling materials, the sequence of operations and their logical physical relationships, the individual operators and their activities. It also studies bottlenecks of production, such as poor or obsolete equipment, inadequate wiring with its consequent voltage problems and decreased production rates, inadequately trained personnel, or lack of proper tools. In short, Production Method Analysis breaks down apparently complex operations into their simple component parts. From such analyses and the subsequent use of modern, high-speed, automatic machines properly tooled and in proper sequence, along with effective materials handling and efficient personnel who know their jobs, comes the healthy industrial employer who is so vital to the well-being of the community and, incidentally, to the utility serving that community. And therein lies our very real interest in Production Method Analysis.

INDUSTRIAL PAYROLLS VS. UTILITY INCOME

There is no mathematical sleight-of-hand involved in developing the relationship of industrial payrolls to utility income in any community or group of communities. Unable to pull up poles and move to where the grass may look greener, and confined to its franchise territory in its quest for new business, the utility's prosperity directly reflects the general prosperity of its service area. Lower production costs, therefore, become of vital concern to us as well as to our customers. Production Method Analysis as a tool in increasing production rates and reducing unit costs has therefore become part of our vocabulary, part of our thinking, part of our program of doing our utmost to help our manufacturers maintain and improve their competitive positions within their own industries.

ELECTRICAL EQUIPMENT PLAYS A PART, TOO

Our allies in the electrical equipment field have an important part in this program too. This is for the reason that better production methods depend on the availability of a sufficient supply of power in the right place at the right time, ready for application to the job of increasing the effectiveness of manhours through efficient transformation into mechanical or heat energy for the accomplishment of industrial tasks. Generating stations, transmission and distribution systems, adequate plant wiring and well engineered utilization equipment are all necessary parts in the over-all picture of industrial and community growth and health. All who have a part in the supply of these facilities strengthen the backbone of better production methods.

ANACONDA JOINTING KITS prevent the possibility of inadequate materials . . . keep stocks fresh and readily available for fast withdrawals. Illustration shows how complete these kits are—right down to a handy checklist of materials.

ANACONDA CABLE ACCESSORIES

A complete line—engineered by power-cable experts—is available in increased quantities.

At Anaconda, the increase in demand for cable accessories is being met by increased production. The complete line—with many exclusive features—consists of the following:

Potheads (capnut, switchgear, transformer, disconnect and through types), featuring unmatched interchangeability of parts.

Unit Packages of Jointing Materials. These kits contain everything needed to make a joint.

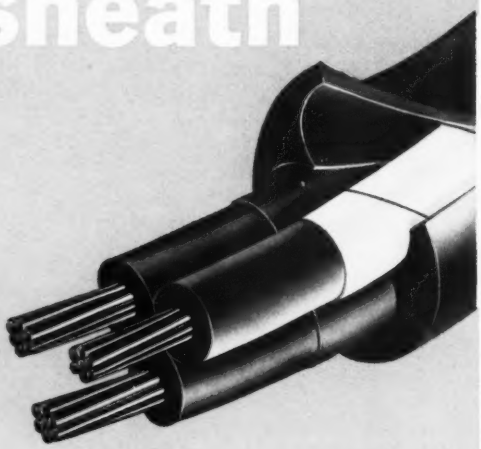
Filling Compounds. Balanced compounds mean greater stability.

Cable Paints and other miscellaneous accessory items.

Bring your cable and cable accessories problems to your Anaconda Representative.

Durasheath

the *all-purpose* ANACONDA Cable for both power and lighting services



Durasheath's* tough neoprene jacket stubbornly resists electrolysis, corrosion, temperature extremes, cutting, abrasion, impact, flame, oil, grease, moisture and most soil acids and alkalies.

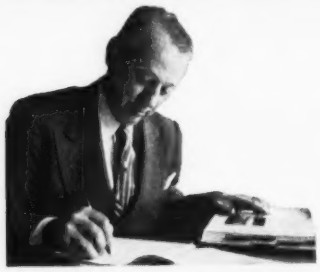
Run it overhead, in ducts, or buried underground—or all three in one continuous run.

It's flexible, easy to handle, economical to install; made in single or multi-conductor construction.

Your nearest Anaconda Sales Office or Distributor can show you why it's good business to install this versatile, all-purpose cable. Just ask them.

*Trademark

TEN BASIC RULES FOR INDUSTRIAL WIRING



BY FRANK AIME, veteran electrical engineer of Anaconda Wire & Cable Company.

Successful operation of an industrial plant depends on the quality of its electrical distribution system. These rules should help in setting up a well-planned system for both large and small plants:

1. Design the system within supply limitations.
2. Locate supply near electrical load centers.
3. Know your load requirements.
4. Let requirements of processes, production and relative importance of the major characteristics of distribution systems determine distribution system type.
5. Select and arrange feeders and equipment so that interruptions never occur more than the process will allow.
6. Select all components from source to load for reasonable future growth.
7. Don't be limited by National Electric Code figures for conductors, conduit and protection which are minimum and primarily for safety.
8. Use load centers when feasible.
9. Select cables with best all-around characteristics for your condition.
10. Aim always for production efficiency, quality and safety.

ANACONDA RESEARCH AT WORK

How a new problem meant a new product

The problem? Loads had outgrown duct space and duct sizes of lead-covered cables. Cables had to be run hotter and under more severe physical difficulties. Cable *sheaths* were failing before *interiors* . . . cable life was limited.

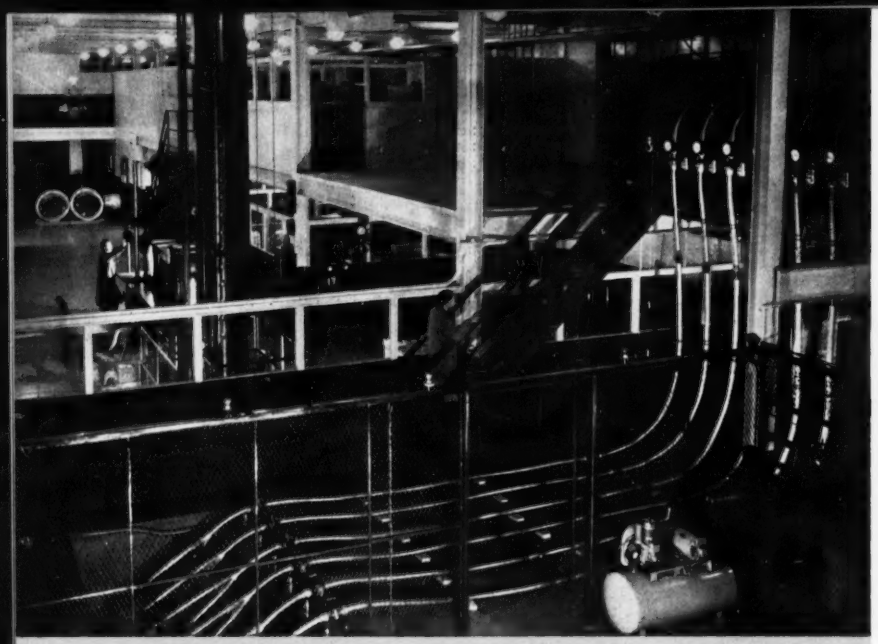
Anaconda research set out to find the answer. Hundreds of sheath alloys were tested. The one finally selected promised far better performance. Called ANACONDA F-3† alloy-lead sheath, it has a high burst strength and a low creep rate . . . resists bending and does not age-harden.

Once again, Anaconda's planned program of research solved a new problem with a new product. Yes, research like this pays off . . . in cable that serves you better!

RESEARCH IS ANACONDA'S BUSINESS, TOO!

†*F-3 Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.*

ANACONDA®



CYCLIC AGING TEST. Here's one method Anaconda Engineers use to learn how lead-covered, paper-insulated cables stand up. In this laboratory, cables are loaded under conditions similar to daily load cycles in the field, but at higher temperatures and voltages. Result: Anaconda Engineers get the facts fast . . . know what can happen years hence . . . and can give you much more reliable performance data.

WHY THIS MAN'S JOB MEANS BUILT-IN QUALITY IN THE CABLE YOU BUY

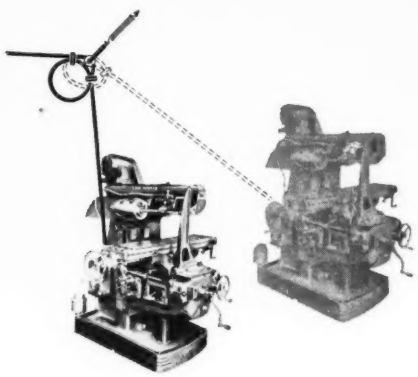
THIS IS ED GITTLESON, Anaconda's Chief Inspector and Manager of Quality Control.

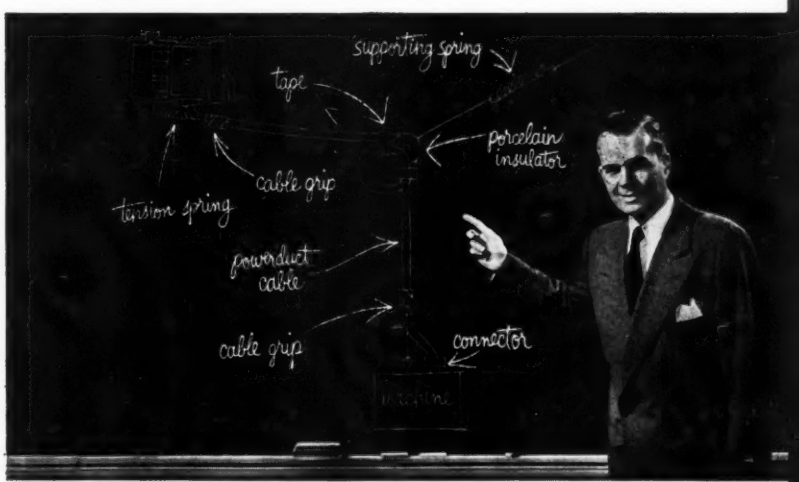
Ed knows that to make a good product and sell it at the lowest possible price, quality must be built in right from the start. That's Ed's job—to see that it's done from raw material to final shipment. Ed has based Anaconda's control program on principles of statistical quality control that assure you not only of *greater* uniformity, but of a *higher level* of quality as well. You can be sure that every Anaconda product more than complies with your requirements.

No busduct system is truly flexible without this

New ANACONDA® Powerduct Cable

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines.





Even if you have a modern busduct system, it may be flexible only so far as it goes. You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Why not match your busduct system with money-saving ANACONDA Powerduct Cable . . . approved by Underwriters' Laboratories, Inc., for busway branches under section 3646, 1951 National Electric Code?

Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. Coil (see illustration) makes local changes easy.

Its tough jacket takes heavy mechanical abuse, is flame-retardant, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

Plan now to add flexible Powerduct Cable to your busduct system. Be sure that you insist on the ANACONDA Trademark—your positive proof of UL approval for this use.

the right cable for the job

SHORTS THAT MAKE SENSE

PRODUCTION TOOL. Good lighting is important in any plant. With it—high quality, profitable production and fulfilled schedules are possible. Without it—spoilage, reduced efficiency, lowered quality control and poor morale may send costs skyrocketing.

ADEQUATE CIRCUITS. A lighting system is no better than the circuits that serve it. Lamp efficiency, for instance, depends on operation at rated voltage. Make sure your circuits are adequate.

PLANNED SYSTEM LAYOUT. Lack of planning never pays off. A well-designed system always costs less than a poor one. Plan for tomorrow and you cut tomorrow's costs *today*.

TOMORROW'S LIGHTING NEEDS. Many plants install lighting circuits in working areas for an ultimate of two times present lighting intensity. Play smart and follow suit. You won't be caught with your lighting down.

CURRENT RATING. No one value of current-carrying capacity (amperes) can be assigned to any one size and design of cable. Installation and method of operation must be considered.

CABLE TERMINATIONS. Moisture, like death and taxes, plays no favorites. In making cable terminations, it pays to keep this in mind—even at low voltages. There tightness against moisture is just as important as for higher ratings. Yet it's here that failures are far more frequent. Probably due to the feeling that here anything will do in the way of terminating the cable.

OVERHEAD VS. UNDERGROUND. For appearance' sake only, overhead distribution systems are often replaced by more expensive underground systems. But it's entirely possible such a change will also result in a lower annual cost. Reason: freedom from damage by trees, wind, sleet, ice, etc. Reliability is improved.

"LIVE" INSULATING OIL

Heat and electrical stress produce deterioration products which eventually sign the death warrant for insulating oil. Carbon black keeps such oil "alive." It minimizes and removes deterioration products and keeps them outside the field of the dielectric. It continually purifies and stabilizes the oil . . . keeps it clean.

Only ANACONDA Type CB* Power Cable utilizes this phenomenon. Result: greater stability and longer life. This tested paper cable may be obtained with special carbon black binder which adds resiliency, yet possesses adequate strength. A further improvement, F-3** Alloy-Lead Sheath, triples sheath life by its high resistance to slow-bending fatigue, creep, burst and abrasion.

If you're not using Type CB Power Cable, you aren't getting as much service out of your paper cables as you should. We suggest you get the full story from your nearest Anaconda Sales Office.

* CB—Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

** F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

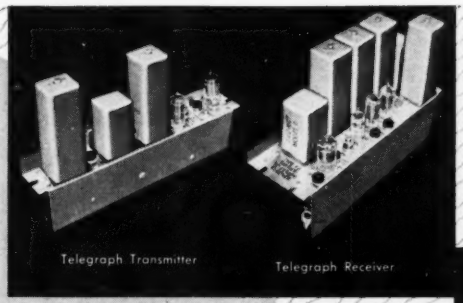
ANACONDA®

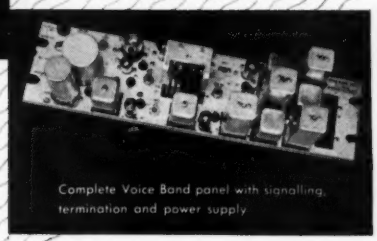
TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF

building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and bus-drop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

63389





NEW WESTINGHOUSE 2000 MC. MICROWAVE FOR FLEXIBLE, DEPENDABLE COMMUNICATIONS

Industrial demand plus Westinghouse experience have teamed up to produce the latest development in microwave communication equipment – the new Type FR-FJ Microwave System.

The Type FR Microwave Radio is designed specifically for operation with the Type FJ Multiplexing equipment. The multiplexing equipment, of the Frequency Division type, provides maximum flexibility and dependability in accommodating many varied communications functions.

The Multiplexing equipment features a self-contained Voice Band Panel which incorporates multiplexing transmitter, receiver, power supply, signalling and telephone termination circuitry on a single panel. Up to 30 duplex voice channels can be provided over a single radio link.

The Type FJ Telegraph equipment is adaptable to all types of telemetering, supervisory control, teletype and other telegraphic functions. It operates directly into the radio equipment, rather than through the Voice Band Panel. The telegraph transmitters and receivers are readily changeable from one type of operation to another.

Double sideband modulation and crystal control are used for simplicity and ease of maintenance in the multiplexing units. These units are connected directly to the radio equipment, no intermediate equipment being required. The radio equipment only is common to all channels and is conservatively rated for long life. It has adequate reserve power, assuring maximum transmission reliability.

Before you decide upon any communications medium, it will pay you to examine the new Westinghouse Type FR-FJ Microwave System. For full information call your Westinghouse representative or write: Westinghouse Electric Corporation, Carrier-Microwave Section, 2519 Wilkens Avenue, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

J-02259

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Allis-Chalmers Announces the *Pneu-draulic* Operator for Power Circuit Breakers

Operator combines advantages of Pneumatic and Hydraulic Operation, *sets new standards in reliability*

FOR THE FIRST TIME the inherent reliability, simplicity and low maintenance of hydraulic operation are combined in one circuit breaker operator with the proven high speed advantages of pneumatic operation.

Tests on the largest breaker ratings have recorded 15-15-15 cycles repetitive reclosing, three successive reclosures within 45 cycles... and have proved the possibility of even faster operation if needed. In addition to high speed reclosing, there are many other important advantages in the new design:

- Full mechanically trip-free operation for positive circuit interruption under all operating conditions.
- Positive high speed contact closing. Power is applied to breaker mechanism through direct acting operating piston.
- Sealed fluid system free from moisture and dirt problems.
- Operating characteristics unaffected by temperature change.
- Manual pump will provide power for breaker maintenance operation at full speed or at completely controlled speed. Complete installation and test can be made without control power.
- Minimum of 5 closings from stored energy or by hand pump.

First applications have been made to the three cycle outdoor power oil circuit breakers rated 115 kv up with interrupting capacities of 5000 mva to 10,000 mva.

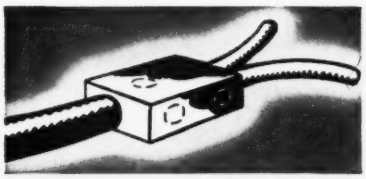
An Allis-Chalmers engineer will be glad to discuss the *Pneu-draulic* operator with you. Call your nearby A-C district office, or write for Bulletin 71R7914, Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3942

Pneu-draulic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

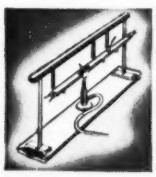
How to get longer life out of your portable cords and cables!



1 USE junction or distribution boxes for making multiple power connections in working places.

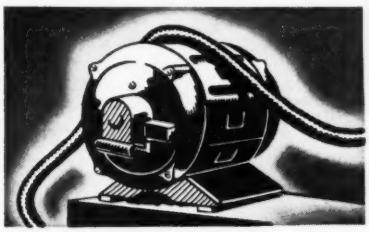
2 PROTECT cables with fuses or circuit breakers of the proper rating for the service. Make sure that circuit breakers will operate properly.

3 PROTECT cables from being run over by heavy equipment. Running over the cable a few times may not cause immediate failure, but may do internal damage which will shorten its life. If the cable must be run across an aisle, place boards on either side as one would for a hose. If it is in use for only a short time, it should be thrown over the truck.

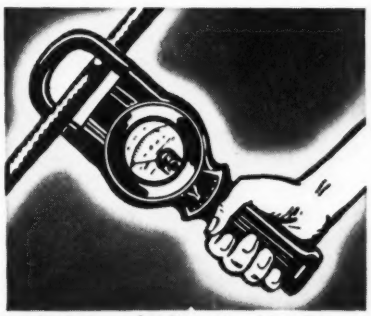


4 USE flame-resistant cables wherever possible.

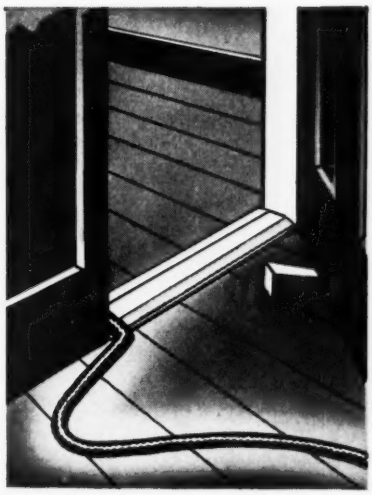
5 DO NOT have portable cords and cables running over steam pipes or other heat-transmitting equipment.



6 KEEP cables away from sparking motors and high voltage equipment. The ozone generated by sparking commutators attacks rubber jackets, causing cracking.



7 AVOID overloading of cables. Where possible, use I.P.C.E.A. recommended current ratings.



8 AVOID dragging portable cords around rough edges or sharp corners. Bruises and cuts hasten deterioration of the jacket. Never yank cords to remove kinks or loosen them when caught on a projection.

9 AVOID running portable cables on pulleys or drums too small for the size of the cable; observe recommended I.P.C.E.A. minimum diameters.

10 KEEP cords away from oils and greases. If they do get into oil, they should be wiped off as soon as possible. Avoid having cords lie in pools of water, chemicals or grease.

11 BUY cables that can carry the required current without overloading or overheating. They should be flexible (have sufficiently fine strands) for the intended use.

FOR FREE REPRINTS OF THIS PAGE, WRITE TO ADDRESS BELOW.

UNITED STATES RUBBER COMPANY

U.S.RUBBER
SERVING THROUGH SCIENCE

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

Harvey Prine gets ready to crate the 100,000th Kyle Type H Recloser as it comes off the production line. This recloser will be displayed at various L-M and industry meetings.

Alice Flancher, Inspector, is testing springs. "We give every spring an over-tension and under-tension test. One of our suppliers didn't see how we could be so accurate, till he saw the testing machines we designed ourselves. Now he's building one like it. These springs are important to the recloser's operation. I'd sure hear about it if I let a bad spring slip past."

100,000th Kyle® Type H Recloser Comes Off The Production Line

"I guess we at Kyle ought to know something about reclosers. We've made so many of them."

by **OSCAR HANDBERG,**
Foreman,
Assembly Department,
Kyle Products Plant,
Line Material Company

I'd like to tell you why you get so much more value in a Kyle Recloser. That value consists of a lot of big and little things.

First, our engineers have more recloser experience. More experience working in the laboratory, and working with you, on your lines.

Second, there's the company's reputation. We're pretty conservative on ratings, on design. Just "commercially acceptable" doesn't go around here. Every piece of our apparatus has to be *right*.

Third, and most important, is the spirit and pride of the men and women who make Kyle Reclosers. You'd be surprised at how much interest there is, all along the line. Most of our people have a pretty good idea of what a Kyle Recloser does, and what can happen if it should fail. So we have very, very few failures.

Our people want their jobs to pass the plant inspections, sure. But they also want our reclosers to pass the real tests—the tests of shipping and handling, and of bad weather and long years of service.

I guess we at Kyle know something about reclosers. We've made more than a hundred thousand of the Type H alone. That's in addition to the other models, and Sectionalizers and Oil Switches.

We know that you, the customer, are the real boss here. And we feel you appreciate the care and the pride of workmanship that goes into every Kyle Recloser.

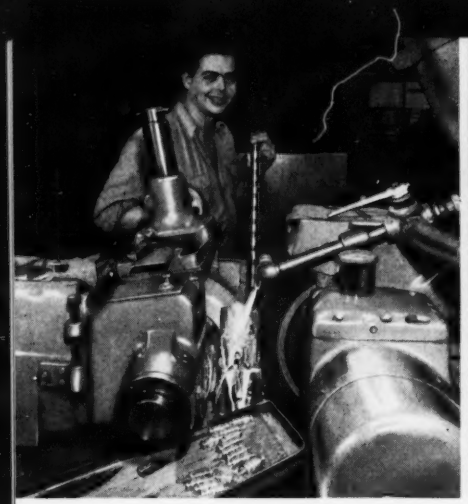
* * *

Kyle Reclosers provide complete, coordinated automatic protection, from substation to load. Kyle Reclosers have many convenience and safety features. There is a full line of single- and 3-phase Kyle Reclosers, for pole and substation mounting, up to 100,000 kva and 6000 amperes interrupting rating.

For full information about Kyle Reclosers, ask the L-M Field Engineer. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Bob Bocock, Coil Winder: "I've been winding coils for a long time. You've got to be sure to have the right number of turns on every layer, and the right number of layers. If I didn't do that, the rating would be off, and Jimmy Hall would rib me for weeks. If we nick the insulation or find a bum spot in it, we just toss it out and start over. No use taking chances on a swell piece of apparatus like this!"

Ed Steele, Final Assembler: "Oscar Handberg, my boss, tells me I've assembled more than 85,000 reclosers. I'm proud of them, too. We are all inspectors as the job progresses. Everyone has gotten into the habit of giving a visual inspection to parts as we use them—that cuts rejects to practically nothing, and we know utility men can sleep nights because Kyle Reclosers are on the job."



George Humsic, Grinder: "I'm grinding trip pistons on this centerless grinder. They fit into the hydraulic frames Lloyd Willms is boring. They've got to have a good finish. If they're rough, they might stick and the recloser might not operate as it should. That could be bad. This is a pretty nice machine. We can hold to two ten-thousandths of an inch tolerance. The pistons will get two more checks along the line. So we know they'll fit."

Lloyd Willms, Lathe Operator: "I've just bored and reamed this frame. This Sheffield air gauge checks tolerances down to less than a ten-thousandth. If one of these bores is a little undersize, George's pistons won't fit. If it's oversize, the recloser won't work right —and Jimmy Hall would catch it on final test. But with all the checking we do, there's very little chance of a bad part ever reaching final assembly."

Harold Murphy, Assembler: "This is the hydraulic frame Lloyd just bored, and I assemble it with the piston George has been grinding. One thing that helps is the way we rack these parts to protect them during handling. This mechanism is simple but we sure are careful about dimensions. If we weren't, some day the wrong recloser might lock out when it wasn't necessary. You just don't get careless on *this* job!"

Jim Hall, Tester: "I guess I am the final word—after Ed has put the recloser together in final assembly, it comes to me and I test it for calibration. The timing of the Kyle Recloser is in the hydraulic system, so after I have made sure of this calibration there is really nothing that can happen to it to change its timing. Believe it or not, in 100,000 reclosers, we have never heard of a part in the hydraulic timing system wearing out. I guess that must be because they all work under oil."

LM®

LINE MATERIAL

Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

Save as much as 14% of initial cost with G-E 7-strand station control cable

General Electric recommends the use of No. 10 Awg 7-strand and No. 12 Awg 7-strand conductors for station control cable . . . based on coordinated studies by G-E wire and cable, instrument, meter, and relay engineers. This cable can save as much as 14% in your initial control cable cost when you compare the No. 10 Awg 7-strand size to cable composed of 19 strands of No. 22 Awg wire.

G-E 7-strand control cable effectively meets today's requirements for control cable flexibility. The 7-strand construction is easier to use with pressure-type terminals than are the older 19-strand types. There is no sacrifice in reliability.

In addition to the important feature of lower cost, the 7-strand control cable promotes standardization by conforming to standard Awg wire sizes—an important consideration when speedy delivery is a major factor.

For more information about 7-strand station control cable see your G-E wire and cable specialist. Or, write to Section W73-425, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

1876 75 1953 YEARS OF ELECTRICAL PROGRESS

GENERAL ELECTRIC

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol OC Turbine Oil

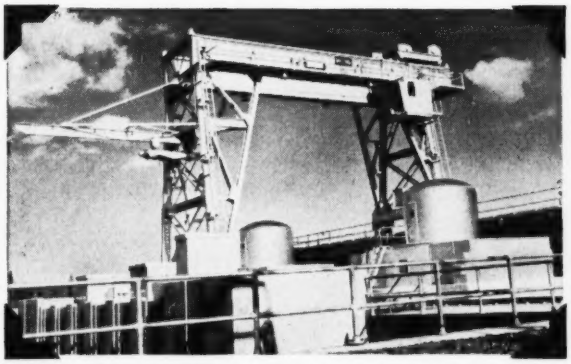
UNIT 9000 KW hydroturbines

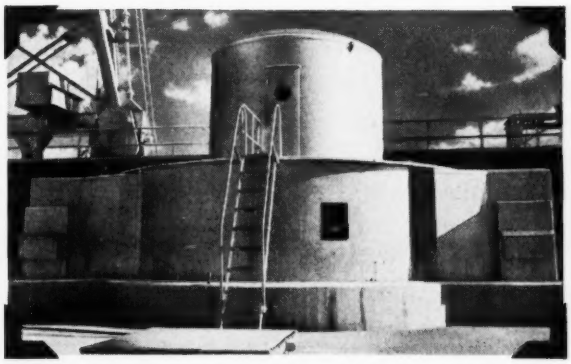
PERIOD 7 years

LOCATION Upper Salmon plant

FIRM Idaho Power Co., Boise, Idaho

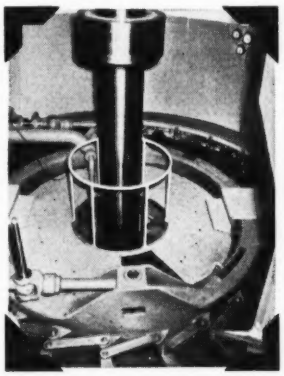
Inhibited oil ends sludge and corrosion problems!





CHARGED WITH CALOL OC TURBINE OIL in 1945, these 9,000 KW hydro-turbines have had no trouble with deposit formation or rusting since that time. Other oils tried resulted in oxidation, the use of too much makeup, foaming of oil and deterioration of insulation. The charges of Calol OC Turbine Oil still filter clear and tests, after 7 years of service, show no increase in acidity. Located at the Upper Salmon Falls on the Snake River, this plant is one of fifteen owned by the Idaho Power Company, Boise.

TURBINE SHAFT and wicket-gate mechanism in one of the units are shown at right. Thrust bearing in the turbine is immersed in a 1,000 gallon basin of oil and carries a load of 755,000 pounds. The Idaho Power Co. has been using Calol Turbine Oil in their plants since 1935.



REMARKS: Extremely wide operating temperatures exist at this plant, varying, at times, from sub-zero to over 160°F.

How CALOL OC Turbine Oil prevents sludging, rusting and wear

A. Excellent metal-wetting ability keeps CALOL OC Turbine Oil on bearings and gears under the heaviest loads—assures constant lubrication.

B. Oxidation inhibitor resists highest operating temperatures; prevents sludge, gum and lacquer formation on parts and in oil systems.

C. Corrosion inhibitor stops rusting even in initial turbine operation, stops the action of both fresh and salt water.

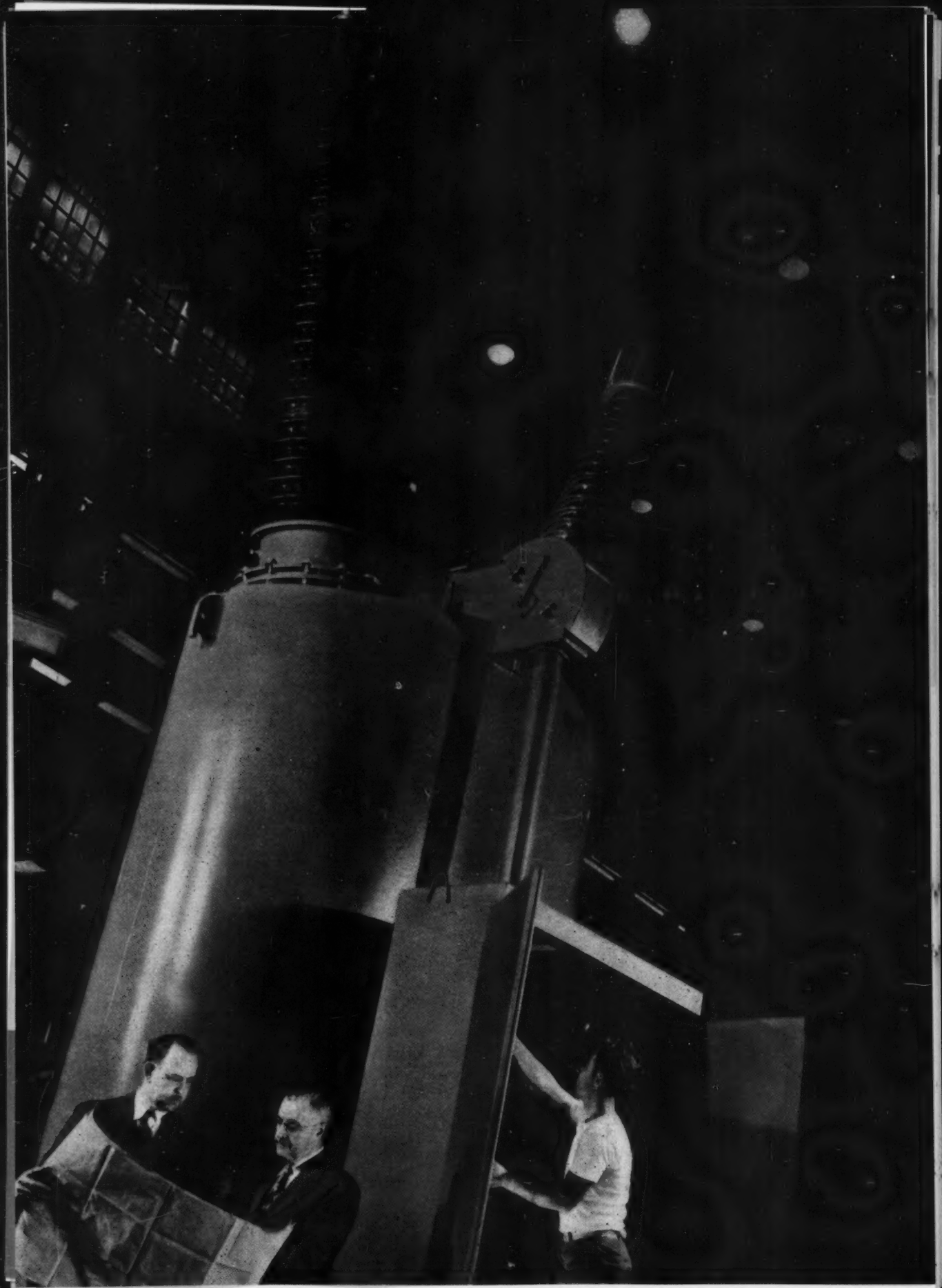
FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, is ready for you. Write or ask for your free copy today.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA



Meeting the Nation's Growing Power Load

Westinghouse "Big Ben" world's highest interrupting capacity!

25,000,000 KVA at 330 KV

A most important question facing America's Utilities today is—"How do we transmit larger blocks of power at a cost low enough to make it practical and profitable?" The right answers to that question are receiving daily attention at Westinghouse.

One of the most recent answers is 330-kv transmission. "Big Ben"—the largest circuit breaker ever built, has been designed by Westinghouse to protect such a system. It is a 3-cycle interrupting, 20-cycle reclosing breaker capable of interrupting 25,000,000 kva and rated at 1600 amperes continuous current. This tremendous increase in breaker rating permits greater concentration of generating capacity . . . more extensive system interconnection . . . eliminates duplication of transmission facilities. Thus total system investment is minimized, and operating and maintenance costs reduced.

This design is an extension of the low-oil-content, dead-tank "Watchcase*" design—developed and perfected after 28 years of High Power Laboratory testing, and proved by field service.

Such products of research and design development give assurance to Electric Utilities that the race to economically satisfy America's growing power appetite will be won. The Westinghouse quest for more efficient, lower cost apparatus will continue to equip Utilities today—for tomorrow!

*Trade-Mark

J-97174-A

"Big Ben"... Low-Oil Content . . . Dead Tank

9600 gallons instead of 20,000! The low-oil-content, "Watchcase" tank of the Westinghouse "Big Ben" requires only 9600 gallons of oil as compared with the 20,000 gallons needed for a conventional round tank. Thus this breaker saves weight, space, oil-handling costs and time, but retains the reliability, safety and economy of the time-proved, dead-tank design.

Condenser-Type Bushings

This high-voltage breaker design was made possible by the fundamentally sound electrical principle of Westinghouse Condenser Bushings. Equal capacitance steps, from high-tension stud to grounded flange, are obtained by layers of oil-impregnated kraft paper interspersed with layers of metal foil, carefully machine wrapped under close control. The resultant uniform voltage gradient in the Condenser and over the porcelain weather casing prevents areas of high-voltage stress, and thus eliminates radio interference. Add over-all, high cantilever strength of the bushing design . . . moisture-proof construction . . . low power factor . . . and you have high bushing efficiency and long life.

One Pneumatic Operating Mechanism

A single pneumatic mechanism simultaneously operates all 3 poles of "Big Ben". It is *mechanically* and electrically trip free. Contacts open without restraint since opening speed is independent of air pressure or exhaust time. The pneumatic mechanism (AA-14), with its 14″ piston used to close "Big Ben", has the same manufacturing precision and simple accessible mechanical lever system that has been so successful on the AA-7 and the AA-10 mechanisms. These have been used on the complete range of Westinghouse Oil Circuit Breakers from 15 kv, 500,000 kva through 330 kv, 25,000,000 kva. High-speed (20 cycles or better) reclosing characteristics are provided as required.

De-ion Arc Control*

Only two interrupters per pole are used to obtain "Big Ben's" 25,000,000-kva interrupting rating within three cycles. This minimum number of contacts—requiring less maintenance—is possible because of the multi-flow, jet orifice-type interrupter. This De-ion grid uses self-generated oil flow to interrupt medium and high currents and mechanically pumped oil to interrupt load and charging currents . . . all in three cycles. During interruption, oil and gas flow in the grid are balanced, so that high stresses do not reach bushings nor shift alignment. Interruption following a high-speed reclosing is effective because of the high-speed scavenging action of the pump, replenishing the oil supply of the interrupting chamber with fresh oil after each operation.

• • •

Additional advantage of the dead-tank design is that it makes possible the low-cost bushing potential device and bushing-type current transformers. Six potential devices—one per bushing—and a total of 18 current transformers can be provided in each breaker. Accurate billing metering, relaying or linear coupler applications are possible.

For further details on "Big Ben" and similar oil-type circuit breakers for high-voltage transmission, call your Westinghouse Representative—or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE... IF IT'S

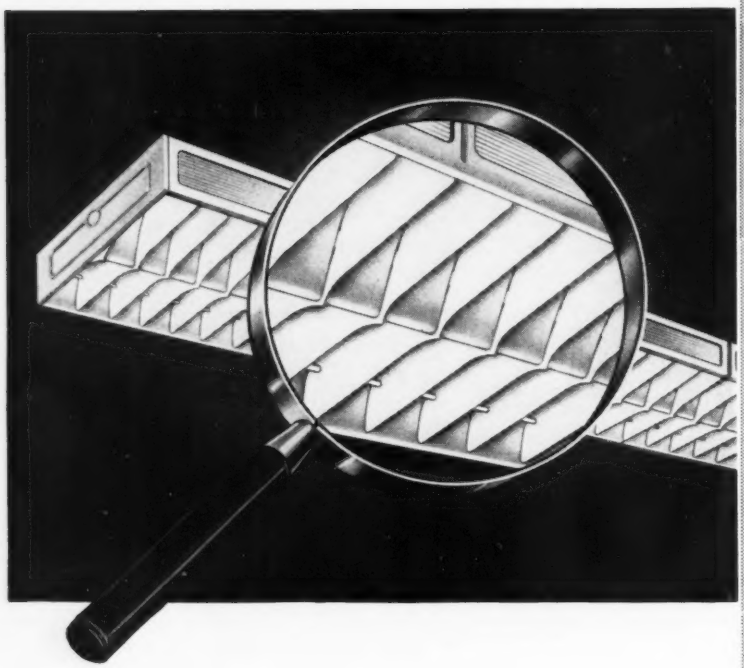
Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Day-Brite "Close-Up" Quality

MAKES YOUR PROFITS SAFE

because it makes satisfied customers



THIS IS A CLOSE-UP of the *interlocking louver* feature of Day-Brite's PLEXOLINE ® fixtures. Each cross-wise louver is firmly locked into the center "V" louver and is tied at both ends by a steel rod. The whole shielding unit is rigid. It won't sag. It won't rattle. Louvers will not twist or bend out of shape during installation or when the fixture is being cleaned or relamped.

THIS "CLOSE-UP" QUALITY FEATURE is important to you because it helps make installation easier, faster and more profitable. It means *safer profits* through elimination of costly, time-consuming "call-backs."

311

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE

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Lighting Fixtures

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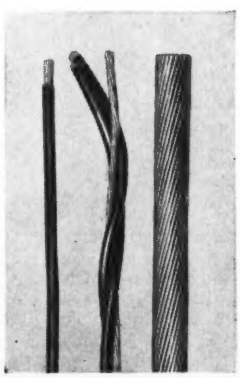

Take advantage of the many services offered by your nearby Kaiser Aluminum ECDistributor. Here are a few:

- He has available large stocks of Kaiser Aluminum Conductor.
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Maximum

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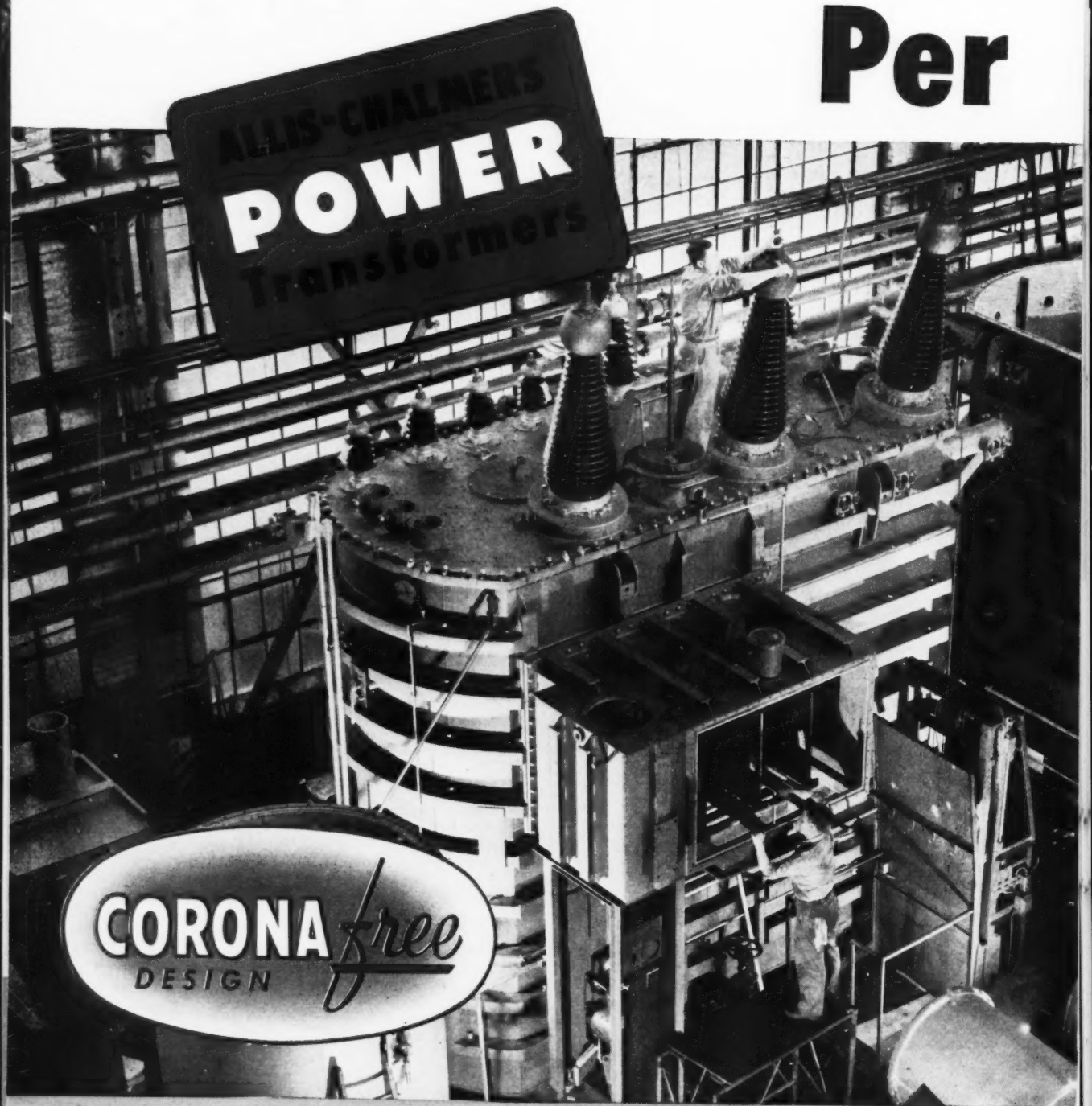


ALLIS-CHALMERS

A-C
ALLIS-CHALMERS

Milwaukee 1, Wisconsin

Return Dollar Invested

Corona-Free Transformers Stay Young Longer

Allis-Chalmers power transformers, thanks to their corona-free design, will produce profits on your system far longer than any transformer not thoroughly protected from the dangerous effects of corona.

How Insulation Design Helps Eliminate Corona

Insulation design reduces effect of concentrated dielectric fields. Danger from dielectric stress is reduced by placing insulation next to critical areas and by shaping insulation surfaces.

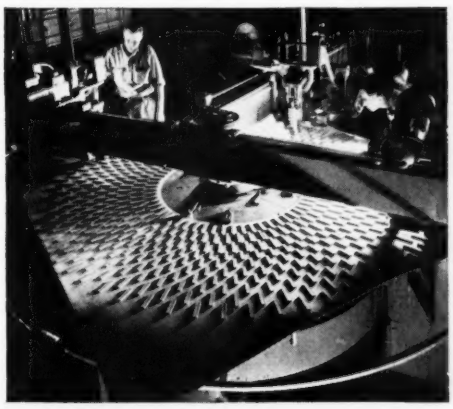
Proof of corona-free design comes when engineers use such tools as calculating boards, surge generators, and oscillographs to test for corona. These tests tell why it pays to install corona-free power transformers.

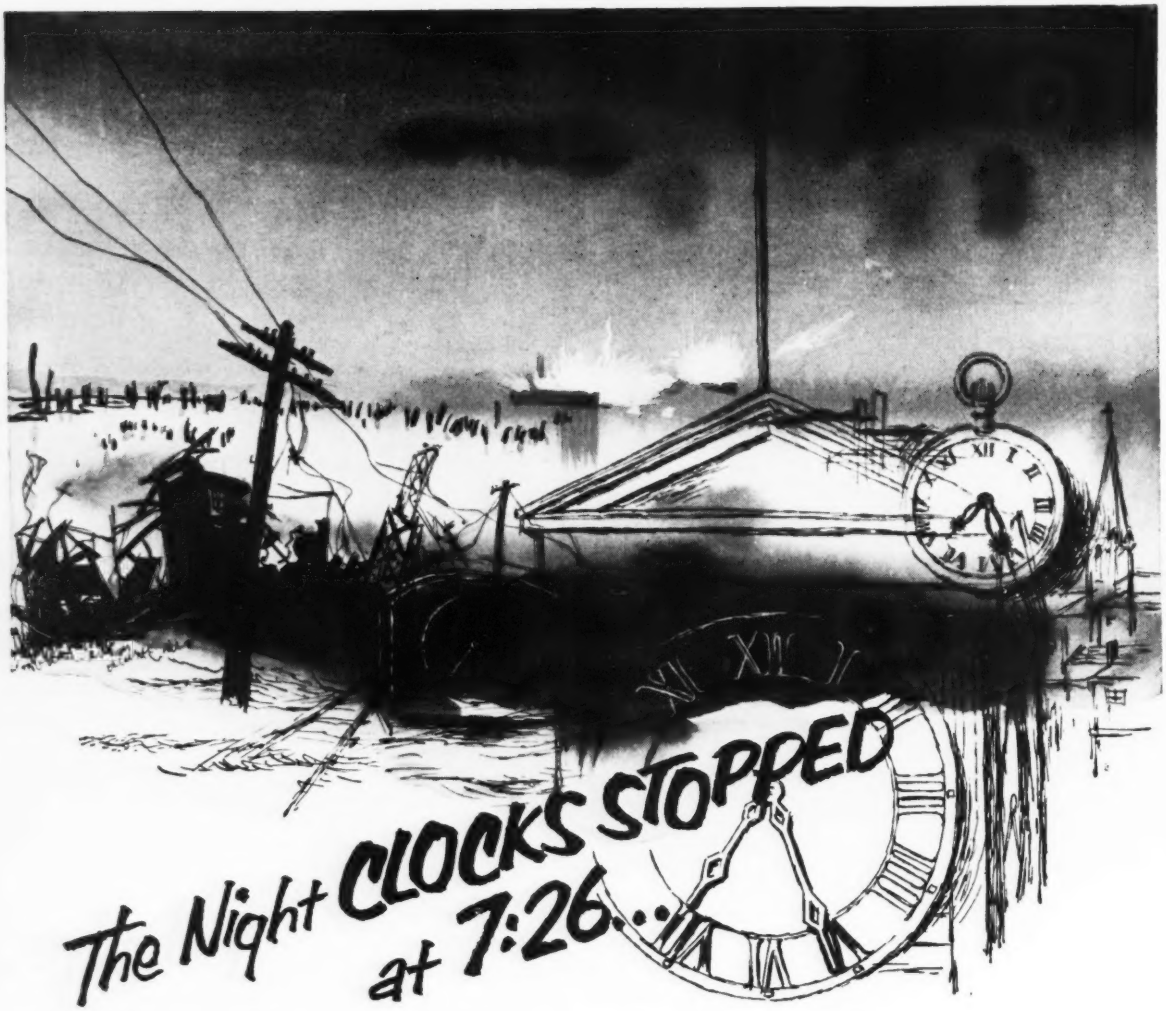
A-4016

Case Study in Improved Production Procedures

You get greater cooling efficiency from Allis-Chalmers power transformers thanks to the unique machine shown here. It fastens tens of thousands of spacers to the fuller board washers used in insulating transformers. The machine works quickly and precisely. There is no possibility that any of the thousands of spacers will be misplaced or improperly attached. This is quite a contrast with the days of painstaking manual labor the job used to require.

Within a few minutes one of the huge fuller board washers is placed in position and indexed. The machine then fastens each spacer separately and presses it into position. This machine is a good example of new machinery constantly being developed and manufactured in Allis-Chalmers extensive tool works. It's an important reason why you get the best workmanship and results when you specify Allis-Chalmers transformers.





Some 9,500 people were in South Amboy, N.J., that drizzly evening in 1950. At the waterfront, longshoremen were transferring the last of 12 freight cars of ammunition to lighters that would carry it to a waiting vessel in Raritan Bay.

But the City Hall clock never got to 7:27—and the freighter's deadly cargo never got loaded. Explosions shattered windows over a radius of 12 miles; and hundreds of people looked at their arms and legs and saw that flying daggers of glass had stabbed them.

At dawn, 312 of the injured had been counted.

★ ★ ★

Such disasters have happened many times before in America. They could happen again. And *if* they do—and *when* they do—there must be blood plasma on hand to take care of the injured. For blood saves lives!

But blood cannot be mined or manufactured. It must come from the veins of healthy men and women. Men and women who feel concern for a suffering neighbor. So give blood—now!

Whether your blood goes for Civil Defense needs, to a combat area, or to a local hospital—this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

National Blood Program

Business Executives!
√Check These Questions!

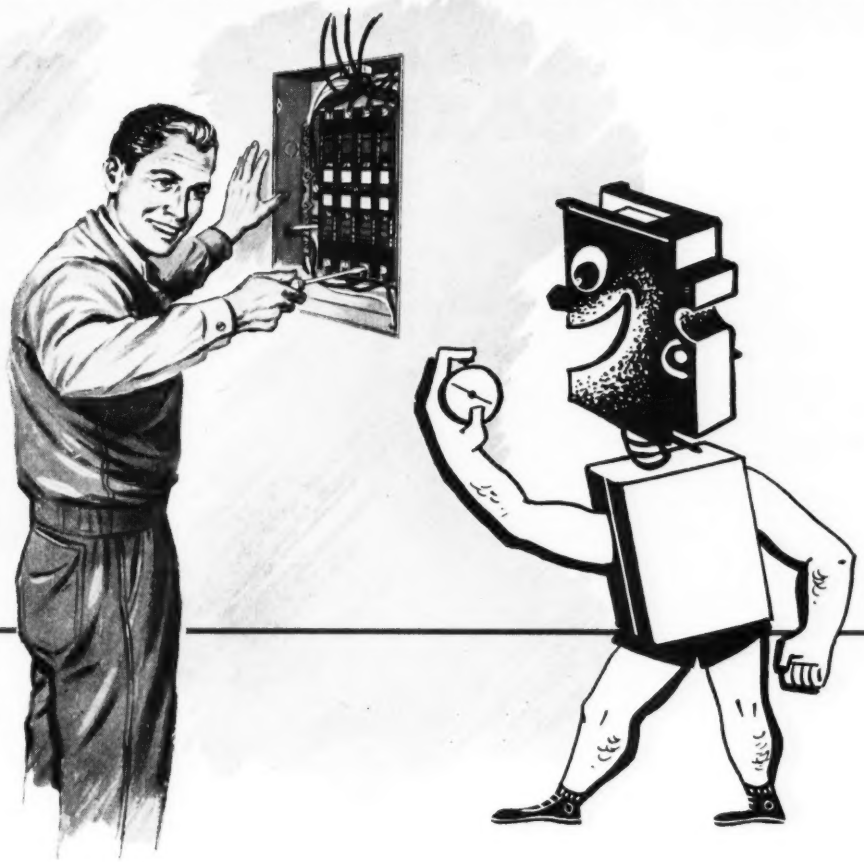
If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

The contractor thought it was silly...

*till he proved to himself the **Stab-lok**® system costs least to install*



REPORT OF INTERVIEW WITH CONTRACTOR:

Q—We understand you compared the time to install different circuit breakers. What was the result?

A—It wasn't even close! Stab-lok was way out ahead. Stab-lok is so much quicker to install that it cuts labor costs way below other systems.

Q—What are the special features that speed up Stab-lok installation?

A—Well, first, Stab-lok plug-in type individual pole breakers provide the quickest method of securely connecting breakers to busses. Second, Stab-lok's solderless lugs give you today's simplest and fastest form of connection. Then, too, Stab-lok's lug type neutral saves the bother of wire looping... and removable main lugs, in the larger devices, save time when installing main conductors.

* * *

Besides these four features, there are still others that make Stab-lok least costly to install... easily removable interiors... large gutter space... conveniently located knockouts... simplest adjustment to plaster level on flush enclosures.

In addition, Stab-lok is the most modern, complete and flexible circuit protection system on the market. Write for full information, and order Stab-loks from your distributor. Federal Electric Products Company, 50 Paris Street, Newark 5, N. J.

Federal Noark products: Stab-lok Circuit Breakers, Motor Controls, Safety Switches, Service Equipment, Industrial Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

FEDERAL NOARK®

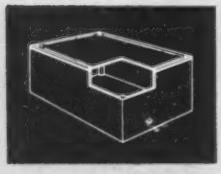
Federal NOARK

FOR HUNDREDS OF **STANDARD** SIZES

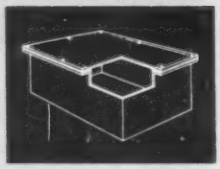
...PLUS COUNTLESS **CUSTOM** VARIATIONS

...CAST BOXES* BY HOPE

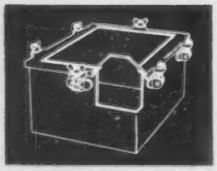
STANDARD TYPES & SIZES



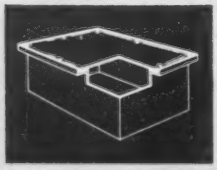
UNFLANGED BOXES
H1200 Type
164 sizes
from 4 x 2 x 2 to 48 x 36 x 17



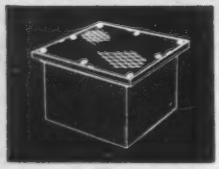
FLAT FLANGED BOXES
H8000 Type
87 sizes
from 4 x 4 x 3 to 36 x 36 x 12



HINGED COVER BOXES
H3200 Type
128 sizes
from 5 x 5 x 3 to 36 x 36 x 12



FLANGED RECESSED COVER BOXES
H7000 Type
51 sizes
from 4 x 4 x 3 to 30 x 24 x 12



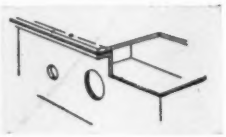
CHECKERED COVER SIDEWALK BOXES
H5800 Type
53 sizes
from 6 x 6 x 4 to 36 x 24 x 14

STANDARD BOXES are of strong, dense cast iron—hot dip galvanized for long service and attractive appearance. Weatherproof construction—rubber-gasketed closure prevents entry of rain, snow, sleet or dust under normal conditions.

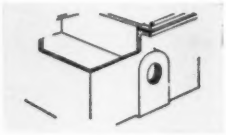
CUSTOM VARIATIONS

You can specify any of these modifications in standard BOXES by HOPE –have them factory-made at moderate cost–and get prompt delivery.

DRILLING—
or drilling and tapping—
of conduit entrances

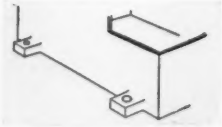


BOSSES—
to provide extra thickness
for five-thread conduit entrances.
Drilled and tapped to specification
if desired



SPECIAL GASKETS —
Neoprene for fungus resistance in hot, humid climates • pure gum for extreme softness and resistance to special acids • Vellumoid for resistance to oils and fats • graphite-free compressed asbestos for installation near boilers or steam pipes

MOUNTING LUGS—
drilled for any desired
bolt size



INTERIOR MOUNTING BUTTONS—
—tapped blind
to specified centers

AND . . . you can order these custom modifications, as well as standard BOXES by HOPE, conveniently and quickly, through your local electrical distributor.

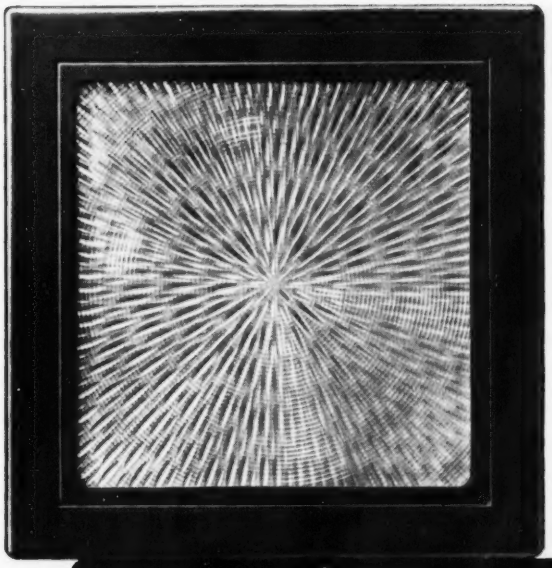
• OUTLET BOXES AND FITTINGS • JUNCTION AND PULL BOXES • HINGED CABINETS • TERMINAL BOXES • EXPLOSION HOUSINGS

HOPE
ELECTRICAL PRODUCTS CO., INC.
338 Wilson Avenue, Newark 5, N. J., Mitchell 2-4426

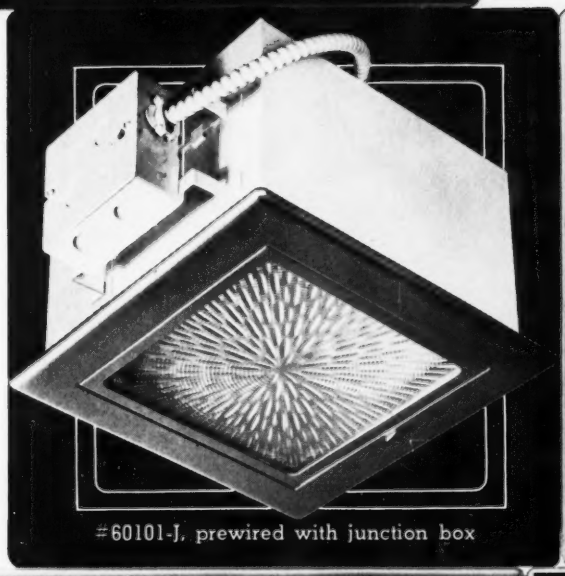
EXPLOSION HOUSINGS BY HOPE

have been extensively used in Class 1, Groups C and D hazardous locations, such as chemical, petroleum and powder plants, pump rooms and paint plants.

GET THE FULL STORY ON BOXES BY HOPE —
WRITE ON COMPANY LETTERHEAD FOR CATALOG



order Sunbeam incandescent fixtures for precise illumination control



#60101-J, prewired with junction box

Sunbeam's new, recessed incandescent line of fixtures incorporate Holophane Controlens* elements to produce controlled illumination in restaurants, stores, offices, public buildings and other areas where moderately high levels of warm-tone lighting is required. Greatly enhancing the appearance of neatness to the installation, the lens frame and outside trim, each, are made in one piece, heavy gauge, die-formed steel with no welded joints and finished in lustrous silvertone. Various shallow and deep models are available for diverse installation conditions and lighting requirements.

Drop-type hinged bottom lens panel opens by gravity when the "finger-tip control" latch is released and locks automatically when closed.

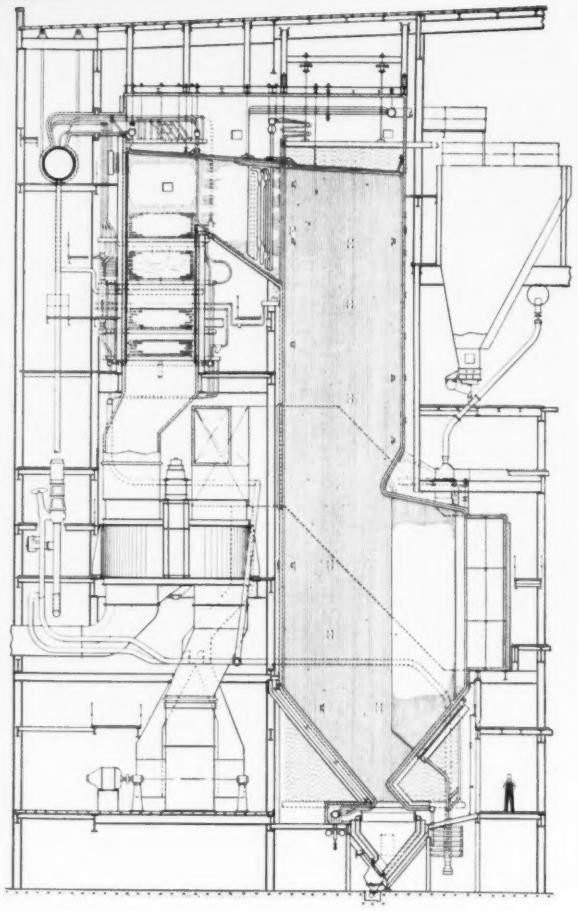
SUNBEAM LIGHTING COMPANY

777 EAST 14TH PLACE • LOS ANGELES 21,

OAK CREEK STATION

Wisconsin Electric Power Company

C-E controlled circulation boilers



The C-E Unit shown above is one of two similar units now in process of fabrication for the Oak Creek Power Plant of the Wisconsin Electric Power Company at Milwaukee, Wisconsin.

Each of these units is designed to serve a 120,000 kw turbine generator. One unit is designed for a throttle pressure of 1575 psi and the other for 1800 psi. Both are designed for a primary steam temperature of 1000 F, reheated to 1000 F.

These units are of the controlled-radiant type. Reheater surface is located in the side furnace walls and primary superheater surface forms the rear furnace wall. The secondary superheater surface is located in the first pass at the furnace outlet. Economizer surface is in the last pass of the boiler and regenerative type air heaters follow the economizer surface.

These units will be fired with pulverized coal employing the storage system with C-E Raymond Roller Mills, Type R Feeders and Type L (Vertical) Burners.

C-E

COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue, New York 16, N. Y.

Western Division: Los Angeles, San Francisco, Seattle

B-615

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

CROUSE-HINDS

Hazardous areas in this plant are lighted by Crouse-Hinds EV Series Explosion-Proof and Raintight Lighting Fixtures

Explosion-Proof LIGHTING FIXTURES

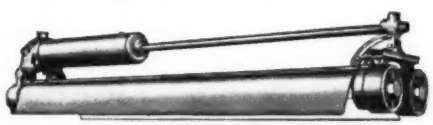
. . . EXCEED the requirements for service in highly explosive atmospheres

To be safe for use in such locations, the fixture must operate at a temperature below the ignition temperature of the gas-air or vapor-air mixture. Also, the fixture must be so strong that it will resist internal explosions without damage and so tight that it will prevent the escape of flames or burning gases which might ignite the surrounding atmosphere.

Crouse-Hinds EV Series explosion-proof and raintight industrial lighting fixtures meet all of these requirements PLUS a wide margin of safety for extra protection.

Complete listings are in Crouse-Hinds Condulet Catalog.

Crouse-Hinds offers a complete line of explosion-proof and dust-tight lighting fixtures for use in hazardous locations where fluorescent lamps are desired.



CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver Detroit — Houston — Indianapolis — Kansas City — Los Angles — Milwaukee — Minneapolis New Orleans — New York — Philadelphia — Pittsburgh — Portland, Ore — San Francisco — Seattle St Louis — Tulsa — Washington RESIDENT REPRESENTATIVES Albany — Atlanta Baltimore — Charlotte — Corpus Christi — Richmond, Va. — Shreveport Crouse-Hinds Company of Canada, Ltd. Toronto, Ont.

A Nationwide Distribution Through Electrical Wholesalers

CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

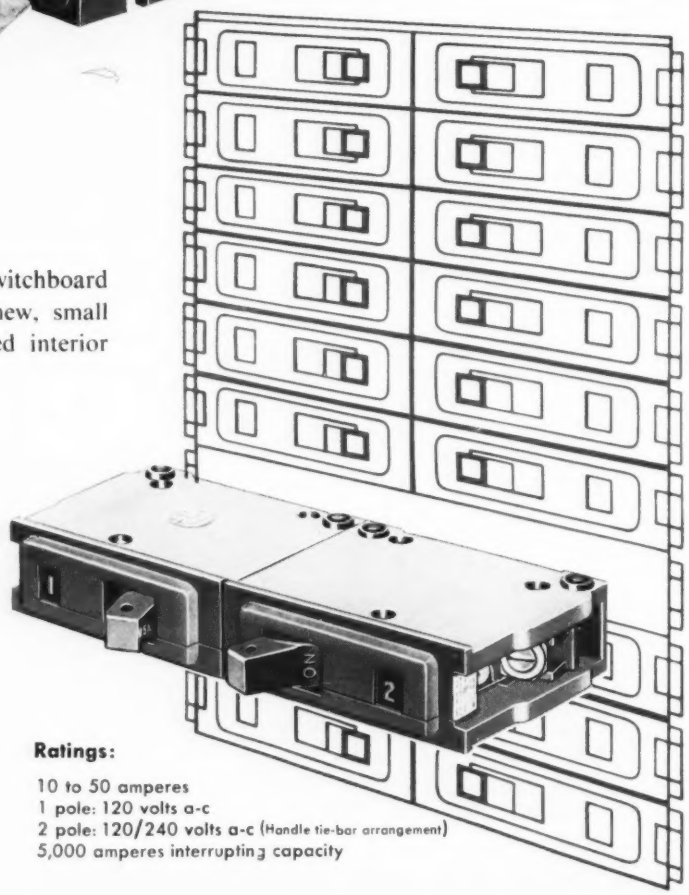
NOW — a new I-T-E

with complete panelboard interior mounting design

ACTUAL SIZE

providing:

- ***extra compactness***
- ***extra flexibility***
- ***extra convenience***
- ***extra quality***



I-T-E is now furnishing independent switchboard builders and electrical manufacturers a new, small EQP *plug-in* circuit breaker and associated interior mounting accessories in an equally new I-T-E panelboard design.

Industrial, commercial, and residential panelboards and load centers can now be reduced as much as 25% in size —without sacrificing quality in circuit breaker protection.

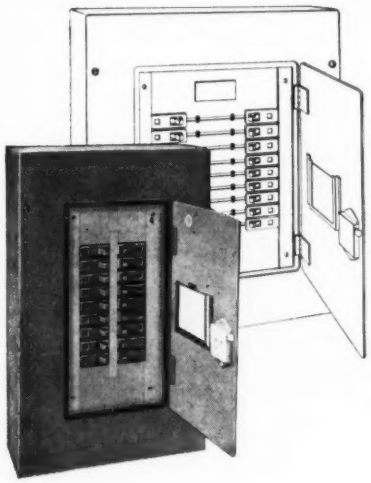
Newly designed I-T-E mounting accessories make possible flexible, compact interior panelboard assembly. The new, small EQP circuit breaker provides:

1. **Thermal-magnetic tripping**
2. **Quick-make, quick-break operation**
3. **Trip-free action**
4. **Time-saving plug-in design**

Ratings:

10 to 50 amperes
1 pole: 120 volts a-c
2 pole: 120/240 volts a-c (Handle tie-bar arrangement)
5,000 amperes interrupting capacity

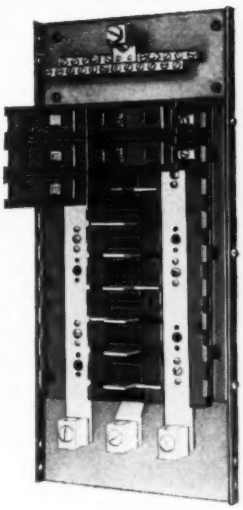
plug-in circuit breaker

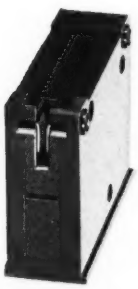


FROM COAST TO COAST

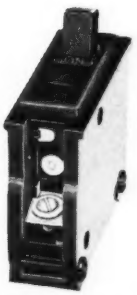
. . . Leading independent panelboard builders are now offering flexible, new I-T-E plug-in panelboard design

Panelboards are now reduced as much as 25% in size, through use of the new I-T-E design. New design provides from 12 up to 42 circuits, sequentially phased for single-phase three-wire 120/240 volts a-c or three-phase four-wire 120/208 volts a-c.

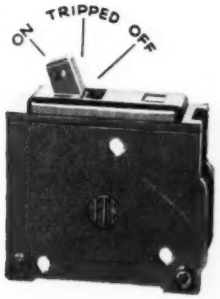




Plug-in pressure-type contacts enable EQP breakers to be clipped directly on bus stabs. Mounting is positive, safe.



Load terminals are securely mounted—easily accessible for quick connection of leads.



Three-position operating handle clearly indicates whether breaker is ON, TRIPPED, or OFF. Service can be restored in a hurry when breaker trips on overload.

Remember—

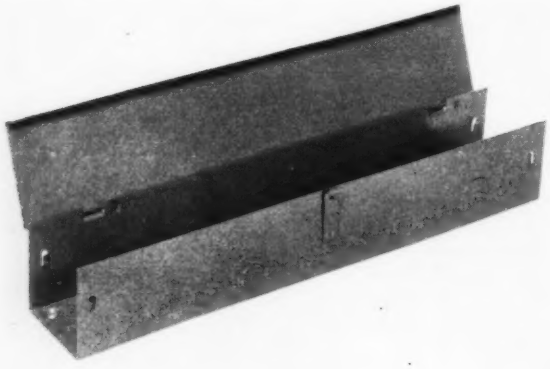
You don't have to compromise with quality to utilize the new, compact lighting panelboards and load centers now available. Specify I-T-E EQP circuit breakers—and I-T-E panelboard construction—throughout. Your local panelboard builder will gladly give you details.

I-T-E

MOLDED CASE CIRCUIT BREAKERS

I-T-E CIRCUIT BREAKER CO. • 19th and Hamilton Streets • Philadelphia 30, Pa.

PRODUCT NEWS



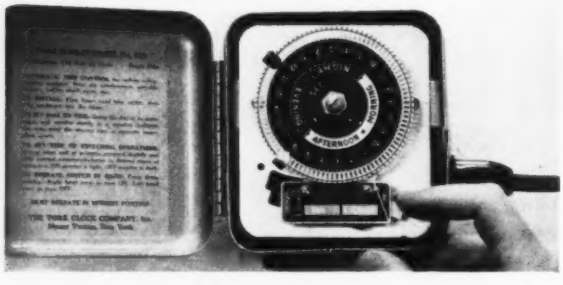
Lay-In Duct

(1) Square D Co., 4335 Valley Blvd., Los Angeles

A steel-enclosed wiring trough for carrying feeders, branch circuits and other groups of conductors is designed to simplify installation. This Lay-in Duct is a raceway manufactured in standardized sections with a hinged cover and catches for fastening. Opening the hinged cover of duct and duct connector provides unobstructed working area to lay in wires, according to the manufacturer, who states that pipe threading or pulling in conductors is eliminated, reducing installation cost. A complete unbroken wireway system can be installed using various fittings.

Connector for the duct is a square-shaped unit with one side hinged by means of a special friction hinge that prevents it from falling closed. Telescope attachment provides for making connections to fittings at varying distance of approximately 2 to 12 in. Adapter fittings may be used for square duct and to connect duct to panelboard cabinets or switchboards.

Lay-in Duct is available in 2½x2½ and 4x4 in. in standard lengths of 1, 2 and 5 ft. A complete line of associated fittings is offered.



Plug-In Time Switch

(2) Tork Clork Co. Inc., Mount Vernon, N. Y.

This portable plug-in time switch, designated 919, is a 24-hour, fully automatic, Telechron-motored unit. It will turn electrical devices on and off at designated times and once set needs no further adjustment until a change in cycle is desired. Manual levers permit a temporary change without altering the master cycle.

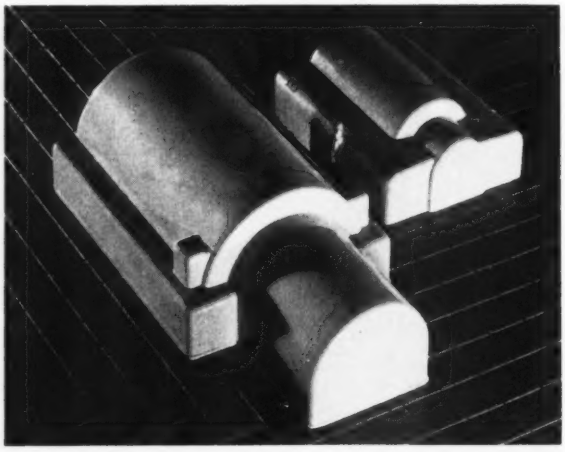
It has four rubber legs and may also be hung on a wall surface; comes with 6-ft extension cord; measures 5x5x3½ in.; operates on a-c; has capacity of 1,650 w; is UL approved.

Accessories include extra operating trippers for additional settings (up to three pairs may be used) and an omitting device that makes it possible to skip certain days without altering the cycle.

Varnish for Class H Insulation

(3) Dow Corning Corp., Midland, Mich.

A silicone dipping and impregnating varnish for Class H insulation, 997, is claimed to cure as rapidly as typical Class B varnishes but to have more than 100 times their dielectric life at 200 C. According to the manufacturer, this varnish shows even less tendency to bubble at 300 F than many of the better organic varnishes and elimination of graduated curing schedules reduces total processing time to less than a quarter of the time formerly required for Class H equipment. It is reported that 997 retains more than 50% of its original dielectric strength after 4,500 hours.



(4) REDUCED SIZE of the completely supercharged steam turbine generator being built by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., is shown by placing a scale model of it alongside a model of a standard hydrogen-cooled machine of the same rating. This first completely supercharged machine, constructed for development and test purposes, will have a nominal rating of 40,000 kw and a 60,000-kw rating at increased hydrogen pressure. Cooled hydrogen is forced at high velocity through the conductors of both stator and rotor. Heat removing ability is so effective in the design that generator length and diameter are both cut to remarkable ratios, according to the manufacturer. Exciter size has been reduced by use of a new excitation system

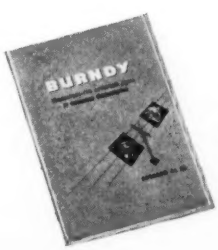
WHY IS THIS STRAIN CLAMP SPECIFIED FOR DEAD-ENDING?

DUW-A

In overhead distribution applications where clearance between phases is limited, this Burndy straight-line strain clamp insures rapid installation, dependable performance and easy re-sagging because:

- Superior alloys and structural design provide maximum strength, permit high tightening torque—with minimum bulk.
  Holding power on aluminum or copper conductors always exceeds 90% of rated breaking strength of the conductor, and in most cases equals the rated strength. (Can also be used on ACSR; refer to Burndy for details.)
- Maximum holding power — without injury to conductor. Saddle under U-bolts distributes clamping pressure uniformly. Tapered front end of groove permits gradual pickup of stress from conductor to clamp. Belled saddle and groove entrances prevent nicking or abrading the conductor strands.
- Long neck facilitates carrying through of jumper loop.
- Design eliminates pockets where water might accumulate —guarding against corrosion.

Aluminum cable to 1510.5 Mcm—Copper to 2000 Mcm.



Consult—"Connectors for Aluminum Cable in Overhead Distribution," Catalog AL53.

BURNDY

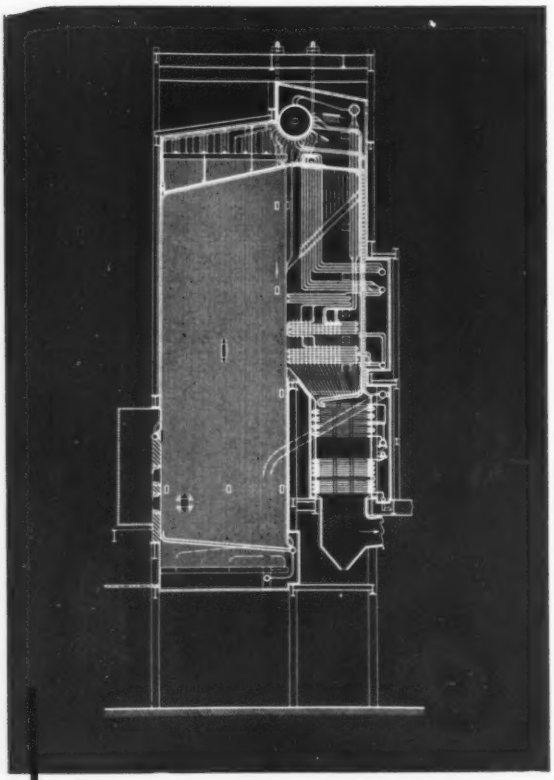
NORWALK, CONNECT. FACTORIES: New York • California **TORONTO, CANADA**

EXPORT: Philips Export Corporation

53-3

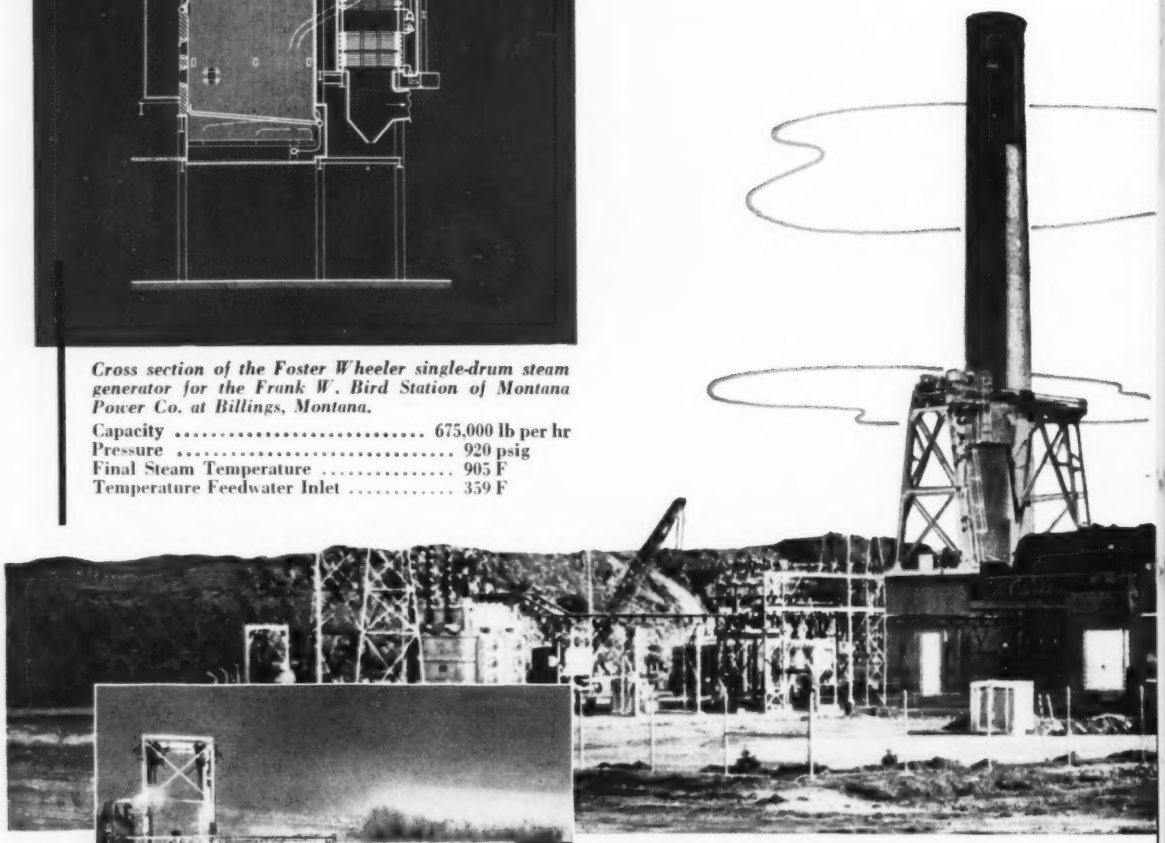
"Operation SUB-ZERO" Proves

Bird Steam Plant shows 11,400 Btu per kwh station output for all purposes



Cross section of the Foster Wheeler single-drum steam generator for the Frank W. Bird Station of Montana Power Co. at Billings, Montana.

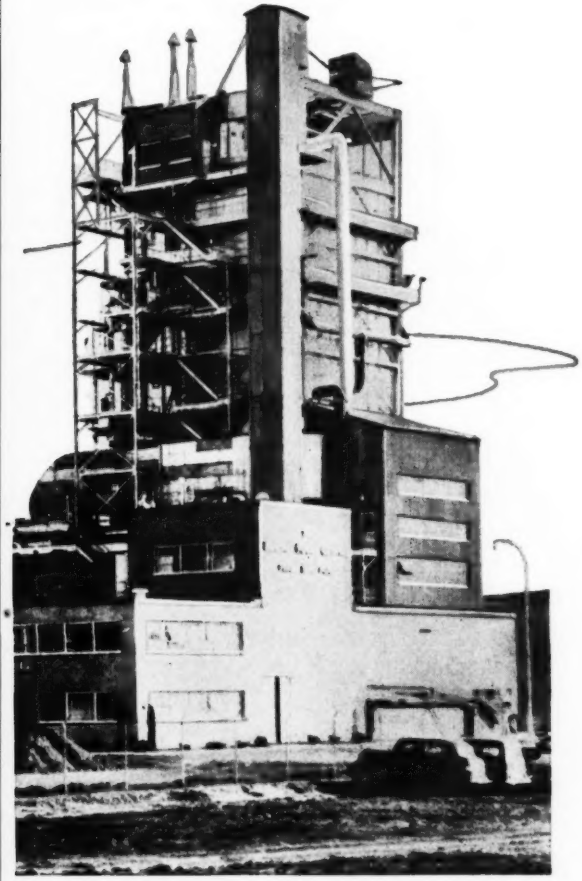
Capacity	675,000 lb per hr
Pressure	920 psig
Final Steam Temperature	905 F
Temperature Feedwater Inlet	359 F



Circulating water intake showing severe conditions of winter operation.

Efficient and Economical

Under the severe operating conditions of temperatures as low as —40F at an elevation of 3100 feet, this semi-outdoor plant of the Montana Power Company engineered by Ebasco Services Inc., has proved efficient and economical in operation and construction. Here are the facts:



HIGH STATION EFFICIENCY

During October 1952, with a metered daily average kwh output of 65,917, the fuel burned for a day consisted of 1,464 bbl of oil, plus 7,630,536 cu ft of natural gas. The oil provided 6,400,000 Btu per bbl, the gas 1,140 Btu per cu ft. Total Btu for all purposes per kwh station output was 11,400.

OPERATED ABOVE RATED CAPACITY

Although normal load condition did not require regular operation above 600,000 lb steam per hour and 60 megawatts, load was picked up to 705,000 lb steam per hour and 76 megawatts in fifteen minutes and carried for two hours.

MINIMUM PERSONNEL

Efficiently operated by only 4 men on each 8-hour shift.

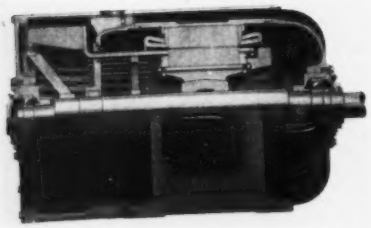
CONSTRUCTED COST

Complete cost, on the basis of 66,000 kw, was approximately $87 per kw.

Once again, the operating facts of an installation indicate the ability of Foster Wheeler to design and fabricate power-producing equipment to meet your needs.

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER



Motor

(5) General Electric Co., Schenectady 5, N. Y.

Designed for use in acceleration of high-inertia loads, type KRX totally enclosed, fan-cooled, high-slip induction motor is said to be as much as 30% smaller and 40% lighter than conventional models of the same type. Space and weight reduction is the result of the new extended-bar design that provides efficient dissipation of the increased heat normally generated by high-slip motors, the manufacturer states. This motor is available in 30 to 150 hp at 900 and 1,200 rpm, 5-8 and 8-13% slip. Voltage ratings are 220, 440 and 550.

Grounding Duplex Receptacle

(6) Slater Electric & Mfg. Co. Inc., 56th St. and 37th Ave., Woodside, L. I., N. Y.

A new 15-amp, 125-v combination 3-2-wire grounding duplex receptacle will accommodate at either end both 3-wire tangential-bladed grounding caps and conventional 2-wire parallel-bladed caps. This unit, No. 326, is UL approved. It is adaptable to d-c circuits also because of its polarized parallel entrances. The grounding terminal, permanently connected to the mounting strap, is clearly marked and has a green hexagonal head screw to permit code identification of the grounding wire, the manufacturer states. Catalog sheet 326 gives details.

Timer

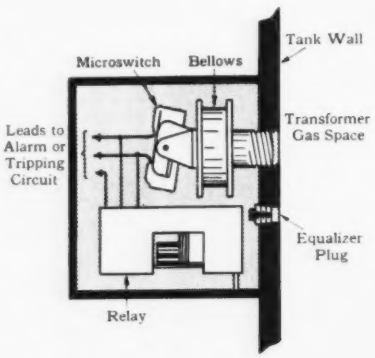
(7) Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.

An automatic timer for intervals from 1/20 second to four minutes provides four basic types of timing, interval, delayed action, automatic repeat and programming, as well as variations of these types. All combinations may be utilized by changing external connections to the terminal board. Type 30HL1 is described in bulletin PC 5010.

Weatherproof Outlet

(8) Pass & Seymour Inc., Solvay Station, Syracuse 9, N. Y.

A new-type positive latching cap is a feature of the redesigned No. 4527 weatherproof duplex outlet. The new cap has serrations for a firm grip, may be latched and unlatched easily but will not loosen, according to the manufacturer. Double-grip outlet is 13202 Despard type, which meets federal specifications. Plate and cap are cast of aluminum alloy treated to withstand severe weather. Cover and plate gaskets seal outlet against elements.



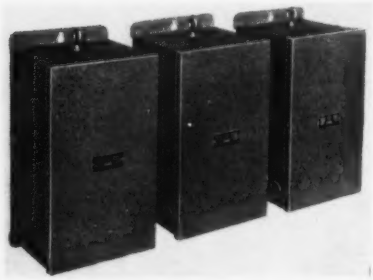
Sudden-Pressure Relay

(9) Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

A sudden-pressure relay that protects power transformers from internal faults operates on rate of change of pressure; is not affected by pressure changes common to transformer operation, the manufacturer points out. In addition, it is said to be more sensitive to small faults and to be quicker to operate when large faults occur than were previous pressure devices.

When an arc breaks down transformer oil, the increased gas pressure is transmitted from the transformer case to the relay device through a small tube. The pressure differential is throttled through the tube and actuates a bellows that is sensitive to a rate of rise of pressure as low as approximately 1 oz per square inch per second.

A microswitch connected to the bellows will either sound an alarm or trip a breaker to take the transformer out of service. A manually operated momentary off switch is provided to reset the relay. Faults that produce rates of rise of pressure of 10 to 15 lb per square inch per second cause the relay to operate in two or three cycles. Rates of 40 psi per second cause operation within ½ cycle.



Lighting Transformers

(10) Marcus Transformer Co., Hillside, N. J.

This new line of general-purpose lighting transformers for indoor and outdoor installations comes in sizes from 1 to 15 kva, single and three phase, up to 600 v. Designated type C, the units feature Class B insulation with the new DuPont Mylar polyester film, claimed to have greater puncture strength. Photo shows 10-kva units.

Distribution Transformers

(11) Burton Equipment Co. Inc., 4810 Firestone Blvd., South Gate, Calif.

These dry-type distribution transformers are totally enclosed in steel cases that allow cooling by natural draft of air through space between the case and overhanging covers. The windings are well ventilated by ducts to insure continuous duty at 55 C temperature rise with Class A insulation or 80 C rise with Class B insulation.

Four types of cases are furnished. Conduit entrance is through the bottom on wall-mount cases and through the ends on floor-mount cases. Wall-mount brackets can be furnished for floor-mount transformers. All cases are dripproof, and weatherproof cases can be furnished. A roomy terminal compartment gives access to flexible leads.

All standard types are constructed according to NEMA, AIEE and ASA standards.

. . . but they can if they're made of

Left: Victor No. 729 Stacking Unit undergoing cantilever test to determine ultimate strength.

It's pretty satisfying to know that the insulators on your system can take more punishment than they'll ever get in service. That's why more and more power men specify Victor *Purified Porcelain* insulators. Laboratory tests show they have unequalled cantilever, torsion, tension, and compression strength, perfection of glaze and durability under all service conditions. For complete engineering data, send for Bulletin No. 5.

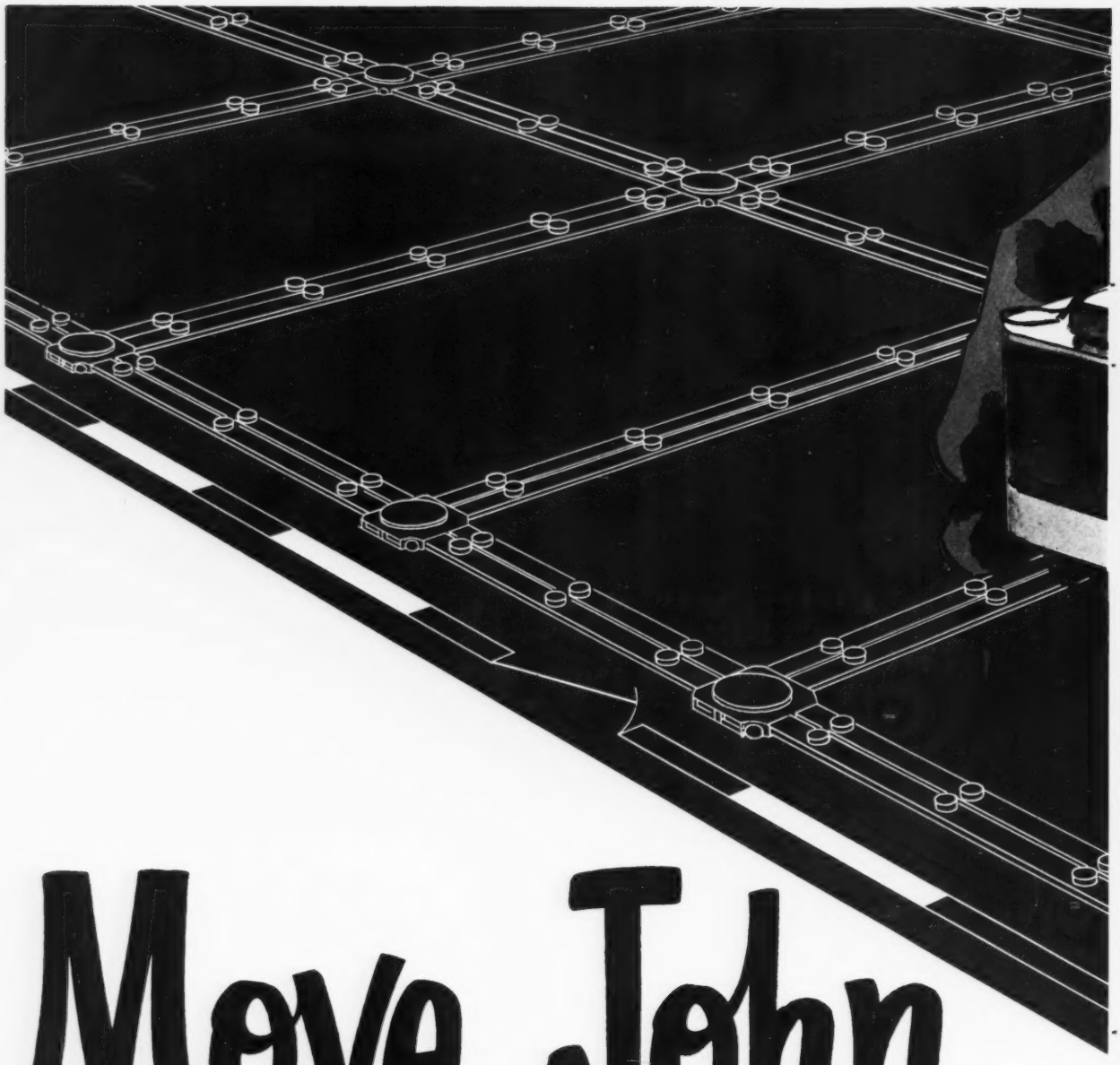
VICTOR NO. 742 (NEMA TR-NO. 7) SWITCH and BUS INSULATOR

FREE BOOKLET gives you the full story on how Victor insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

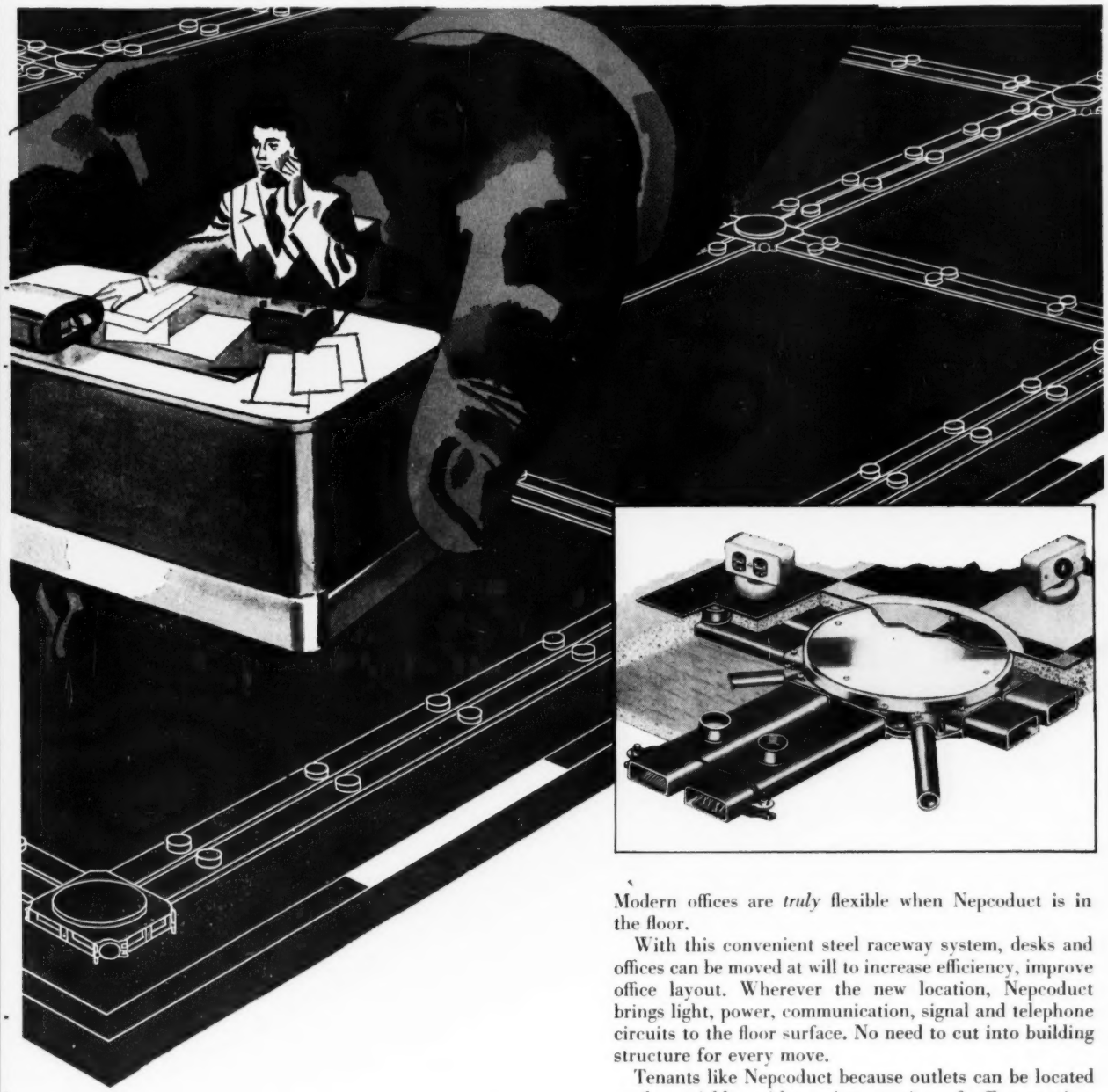
Specify

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain



Move John anywhere...



. . . in buildings with **Nepcoduct**
telephone and electric
light and power outlets
are everywhere!

Modern offices are *truly* flexible when Nepcoduct is in the floor.

With this convenient steel raceway system, desks and offices can be moved at will to increase efficiency, improve office layout. Wherever the new location, Nepcoduct brings light, power, communication, signal and telephone circuits to the floor surface. No need to cut into building structure for every move.

Tenants like Nepcoduct because outlets can be located easily, quickly, with no interruption of office routine. Building owners like the economical maintenance it allows. Architects and builders like its adaptability to any type of building, any type floor construction.

Nepcoduct is the *standard* underfloor wiring system—steel for permanence, grounded for safety.

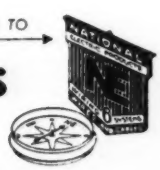
For life-long flexible wiring, be sure that Nepcoduct is in *your* plans—for new construction or modernization. Write today for the Nepcoduct catalog.

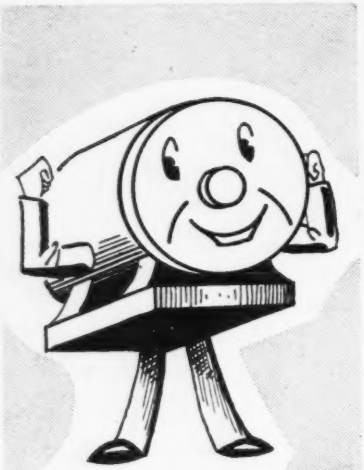
EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 33 Sales Offices





I'VE GOT THAT "EFFICIENCY OF OPERATION" FEELING!

I'M EQUIPPED WITH

OHIO MOTOR BRUSHES

We have always maintained that:—"THE HEART OF THE MOTOR IS THE CARBON BRUSH".

For thirty-six years this organization has been producing standard types and specially designed motor and generator brushes for industry. Consequently, our engineering staff possesses the "know-how" gained only through many years of experience. Write or phone us, outline your particular needs and we will promptly make recommendations that will maintain the efficiency of your motors.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
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544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

Improved Baseboard

(12) Wesix Electric Heater Co., 390 First St., San Francisco 5, Calif.

Designed to give more heat from cooler panels an improved baseboard is capable of a heat output of 157 w per lineal foot of element and operates at a lower average surface temperature than previous models. According to the manufacturer, this 50% increase in wattage was made possible primarily by use of the principle of secondary and primary air flow. The new panels have two openings, one at the front to direct heated air into the room and the secondary air flow to provide an insulating blanket of cooler air against the wall surface. Another secondary air passage in the interior of the heating assembly brings a flow of cooler air across the front of the element frame.

Maximum front panel temperature of 140° is said to be low enough that drapery of standard materials may be hung over the baseboard provided they are kept at least ¾ in. from the floor to allow air entry into lower opening.

Adapter Ties In Remote Signals

(13) Panalarm Products Inc., 6312 N. Broadway, Chicago 40, Ill.

Remotely located visual trouble signals will operate as part of a common plant-wide audio-visual annunciator system by use of an adapter unit recently announced.

For the remote visual signals, either individual back-lighted, illuminated name-plate units or bullseye lamps are furnished and may be used for scattered locations on panelboards or operating locations in the plant. Bullseye lamps may be used also with separate on-off lights to form a three-light control station. All signals connect to a common horn or bell, which must be acknowledged by the operator when an off-normal condition develops.

The adapter cabinet is prewired for all standard audio-visual sequences. They may be interchanged in the field by simple terminal connections, according to the manufacturer. Adapter cabinets are furnished for any desired number of signals and operate from any type of remote contact device, it is stated. Bulletin 3-C gives details.

For More Data
Fill in Coupon on Page 80

Tester

(14) Martindale Electric Co., 1306 Hird Ave., Cleveland 7, Ohio

This new model 52 V.A.O. tester has four testing ranges: volts, a-c and d-c, 0-10, 0-50, 0-250, 0-1,000; a-c only, 0-2.5; amperes, d-c only, 0-10; ohms, 0-1,000, 0-10,000; megohms, 0-1, 0-100. A selector switch gives four positions: volts a-c, volts d-c, ohms, amperes. The range switch has five positions, which provide for the five voltage ranges, four ohm ranges and one ampere range. Two pairs of sockets for plugging in test leads are clearly marked. Test leads are 4 ft long and come with both prods and alligator clips.

Pocket-Size Volt-Ammeters

(15) Pyramid Instrument Co. Inc., Lynbrook, N. Y.

Reading may be taken without interrupting the circuit or shutting down equipment with a series of three pocket-size Amprobes in a range that measures up to 1,200 amp. Snap-around construction permits the device to measure current instantly without being connected to the conductor.

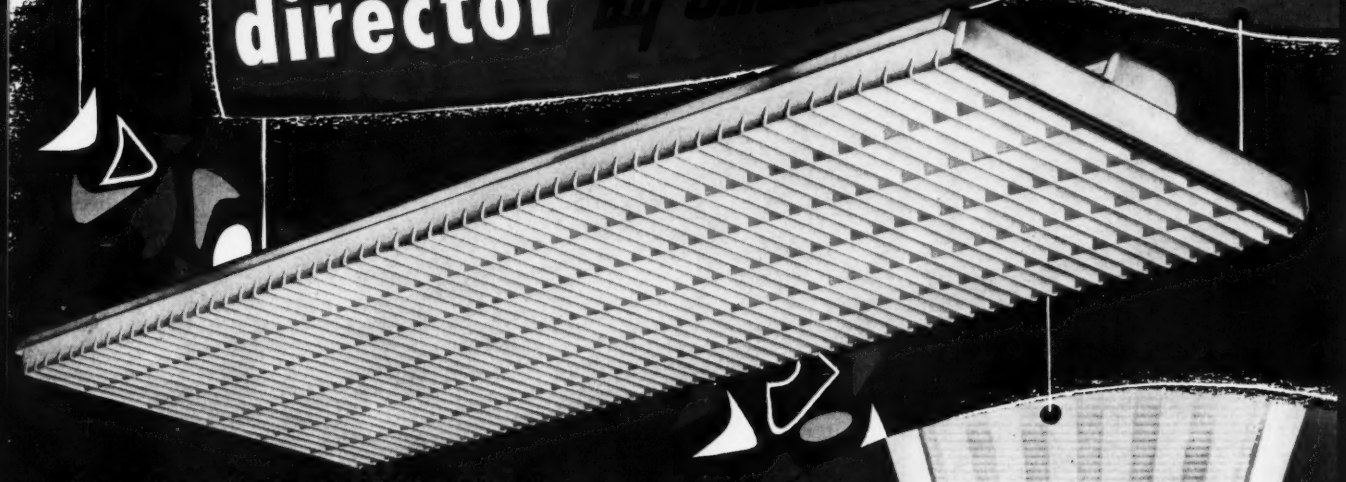
Voltage test leads have new retractable safety plug that automatically insulates itself when removed from the meter. Jaws are completely insulated down to the sockets. Probe jaws are pointed for working in crowded switch and terminal boxes. The doughnut-type transformer eliminates for all practical purposes the factor of error from position of conductor within probe jaws, according to the manufacturer.

Model 300 has nine ranges up to 300 amp a-c and 600 v a-c. Model 600 ranges up to 600 amp and 600 v. Model 1200 ranges up to 1,200 amp and 600 v.

today's finest fluorescent luminaire

director

by Smithcraft



For a truly sound investment of lighting dollars, the Smithcraft Director is in a class by itself! Installed in literally thousands of banks, stores, schools, offices and similar locations across the United States, the Director is actually a "lighting element" that provides highest quality illumination through large unobtrusive **area of light** source. (The eight-foot, six-light Director provides more than 24 square feet of light source.) Here is ideal lighting that blends with overhead architecture without imposing on the eye the dominance of conventional fixture design.

More than just another lighting fixture, the Smithcraft Director, through its distinctive appearance and superior lighting qualities, brings many **plus** values wherever it is installed. In banks, insurance companies and public buildings of all kinds, it lends an atmosphere of substance and dignity; in offices it contributes greatly to efficiency; in stores it adds to the general selling appeal of both the store itself and the merchandise it sells. **There is no finer lighting investment.**

The Smithcraft Director is available in sixteen different units — for Bi-Pin and Slimline Lamps — with louver shielding of 35° crosswise, 25° lengthwise or with deluxe louver shielding of 40° crosswise, 35° lengthwise. There is a unit to fit the needs exactly of any installation.

For evidence of the superior lighting qualities of the Smithcraft Director, send now for the new eight-page Director folder incorporating the results of comparative tests conducted by one of the nation's outstanding utilities, a leader in lighting.

Smithcraft
LIGHTING DIVISION
CHELSEA 50, MASSACHUSETTS

NEW

Tri-onic*

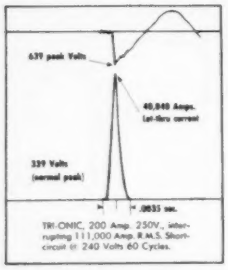
*Interrupting Capacity
25000 Amperes A. C.

Interrupting Capacity Rating in excess of Underwriters' Laboratories Standards is established by tests conducted in accordance with AIEE Standards #25 on Power Fuses and NEMA Standards on Power Fuses.

SHAWMUT'S NEW TRI-ELEMENT
All-Purpose Superfuse

Here is a newly designed All-Purpose Superfuse. Use it wherever you need One-Times, Renewables or Dual Element fuses. Tri-onic is the first low voltage fuse with a published interrupting capacity of 25,000 Amps. at rated voltage for fuses. This is 15,000 Amps. more than required by Underwriters' Laboratories Standards for fuses.

TRI-ONIC, THE NEW TRI-ELEMENT SHAWMUT SUPERFUSE COMBINES:



TRI-ONIC, 200 Amp. 250V., interrupting 111,000 Amp. R.M.S. Short-circuit @ 240 Volts 60 Cycles.

A TRI-ONIC FOR EVERY CIRCUIT These new high I.C. protective devices are available in 141 normal current ratings, ranging from 1/10 to 600 Amps. for both 250 and 600 Volt circuits. For safety's sake insist on Tri-onic. Protect yourself and your circuits. Send for Tri-onic Bulletin now.

1. HIGHER I.C. 25,000 Amps. @ 250V and 600V. It can handle short-circuits 2½ times larger than ordinary fuses. Tri-onic expands fuse application into the 25,000 Amp. zone with the same interrupting rating and time-current characteristics as 25,000 Amp. molded case air circuit breakers. Buy Tri-onic for bus plug-in duct, bus-ways, feeders, motor control panels and branch circuits.

2. LONG TIME DELAY, based on heat absorption principle, permits Tri-onic to safely start heavily loaded motors without blowing. Eliminates needless "outage" of circuits due to heavy inrush currents or load swings.

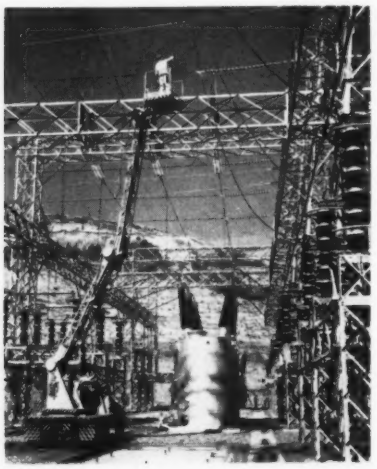
3. COOLER due to Tri-onic's inherent low resistance. I^2R losses very low. Blowing temperature is 286°F or 500 degrees lower than that of ordinary zinc links. Use it for distribution boards, panel boards, motor starting panels, knife and enclosed switches.

OUR 60 IN YEAR — FROM EDISON TO ELECTRONICS

Tri-onic — "Awake At The Switch"

THE **CHASE-SHAWMUT CO.**

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS



Lift

(16) Stemm Bros. Inc., 14th & Commercial, Leavenworth, Wash.

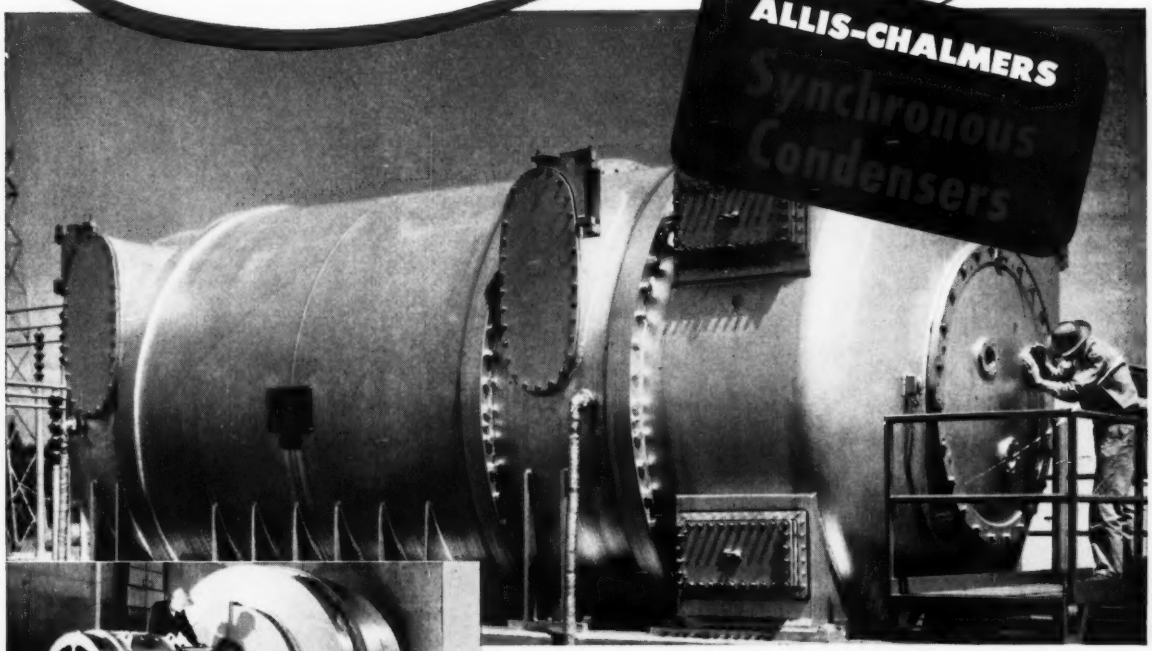
The Hi-Tender is a hydraulically controlled unit consisting of a lower and outer mast that elevates the operator into position for off-the-ground work. It is controlled direct from the operator's cage. Jointed masts are designed to manipulate the operator up and over obstructions into normally inaccessible positions. Units are available from 30 to 60 ft and have a continuous rotation of 360°. According to the manufacturer, they are easily mounted on any standard truck or can be mounted on special trailers for inside use. They are usually tailor-made to fit individual need, with provisions for such features as dual controls, insulated cage, rubber bumpers, air and water hoses up the masts.

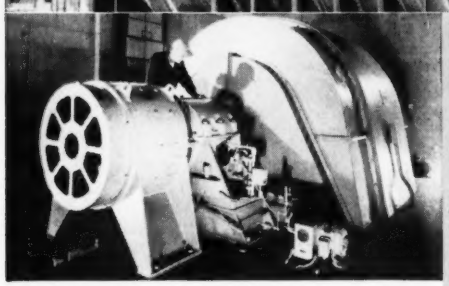
(17) WINDOW FANS — New 24- and 30-in. Atlas-Aire electrically reversible window fans are offered by Atlas Tool & Mfg. Co., 5147 Natural Bridge Blvd., St. Louis 15, Mo. Brackets are provided for installation and a separate mounting panel with the patented extender handle for instant installation is available. The fan unit may be removed for use on the floor by lifting it from the bracket or frame.

(18) ELECTRICAL RESISTANCE—Designed to meet latest NFPA recommendations for electrical resistance tests of conductive materials, model 269 Vibrotest has been announced by Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill. It has two color-coded scales, one for conductive material tests and the other for personnel and conductive shoe tests.

(19) PLATFORM TRUCK — Six-foot aisle operation is permitted by the new Transveyor riding-type electric platform truck, according to the Automatic Transportation Co., 149 W. 87th St., Chicago, Ill. It has 4,000 lb capacity, comes in 6, 7, 9 or 11 in. platform heights. Platform lengths vary from 36 to 72 in.; over-all lengths from 61 to 97 in.

Better than Rebuilding Transmission Lines





Pacific Coast system uses 50,000-kva hydrogen-cooled condenser (top view), and 20,000-kva air-cooled unit (bottom view).

Besides minimizing losses, hydrogen cooling results in a design suited to outdoor operation. Air-cooled units can also be built for outdoor use, and for industrial power-factor-correction applications.

Regulex amplifier control, which acts as both regulator and pilot exciter, is available for all synchronous condenser ratings.

Regulex is an Allis-Chalmers trademark.

FOR WIDESPREAD power systems, synchronous condensers can frequently be used in place of added or larger transmission lines. This is possible because, by supplying reactive kva, they assure efficient use of power lines.

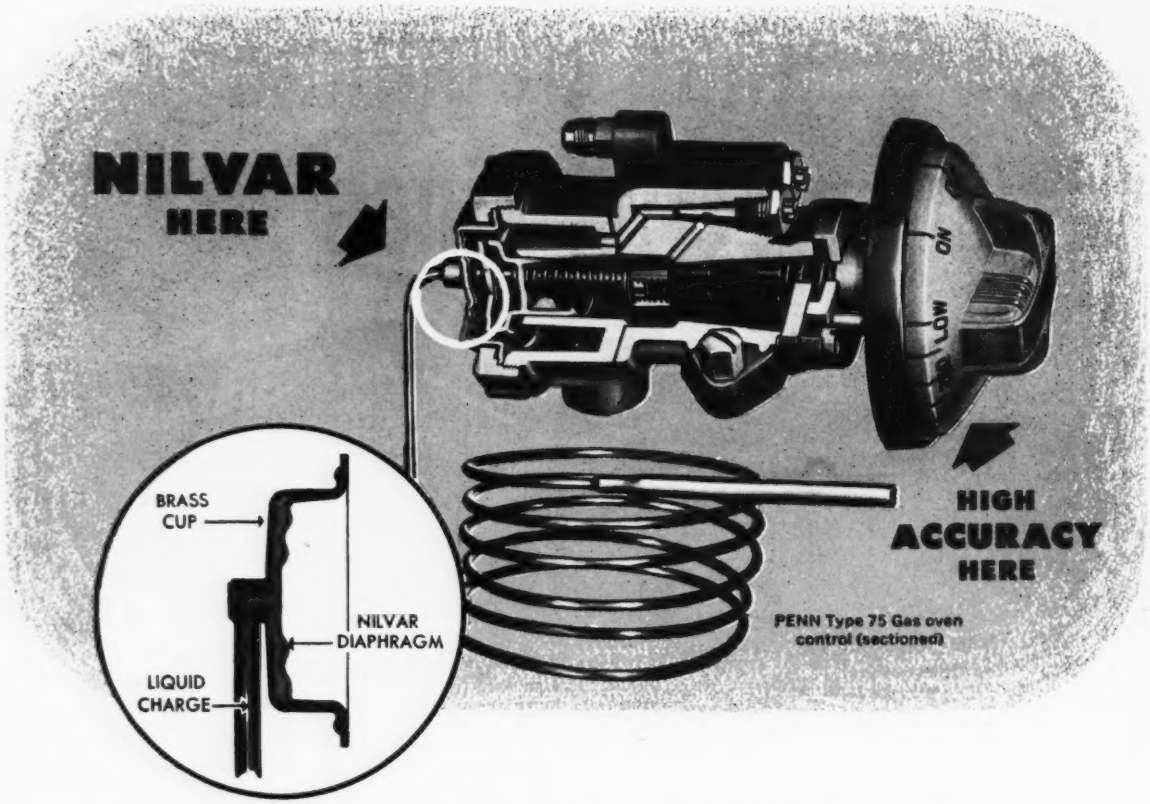
But condensers can do more than just cut conductor requirements. They also provide voltage regulation on a wholesale scale, and furnish rotating inertia for improved system stability.

Custom-engineered to fill system requirements and to fit installation conditions, Allis-Chalmers synchronous condensers can help you hold down transmission costs. For more information on units for utility or industrial applications, call in your A-C representative, or write for Bulletin 05B7285. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3960

ALLIS-CHALMERS

A-C ALLIS CHALMERS



Nilvar* Alloy Makes New PENN Gas Oven Controls Self Compensating

By providing a self-compensating flexible diaphragm assembly for its liquid expansion controls, PENN Controls, Inc. compensates for ambient heat and eliminates control time-lag. Result: controls *accurately* maintain the temperature dialed.

The PENN Self-compensated Diaphragm assembly utilizes a brass retaining cup and a flexible Nilvar diaphragm to form a hollow chamber. This connects to the temperature bulb through a capillary tube, the entire unit being filled with a liquid charge.

Because brass expands much more than Nilvar, ambient heat *simultaneously* increases the volume of the chamber, when it increases the volume of the liquid charge. This self compensation reduces the effect of ambient heat on the diaphragm to zero and permits the diaphragm to respond *only* to bulb temperatures.

PENN specifies Nilvar for this application because it has a very low temperature coefficient of expansion —as low as .000001/C°— lowest of any alloy, and comparable to that of quartz. And its consistent uniformity helps maintain the high accuracy which PENN production standards require.

The remarkable dimensional stability of Nilvar may answer your engineering problems too. Why not talk it over with us. We'll be glad to make recommendations geared to your specific needs.

*T. M. Reg. U. S. Pat. Off.

Nilvar is produced only by

Driver-Harris Company

Western Representative: **ANGUS-CAMPBELL, INC.**

5320 Santa Fe Ave., Los Angeles 58 917 Bryant St., San Francisco 3

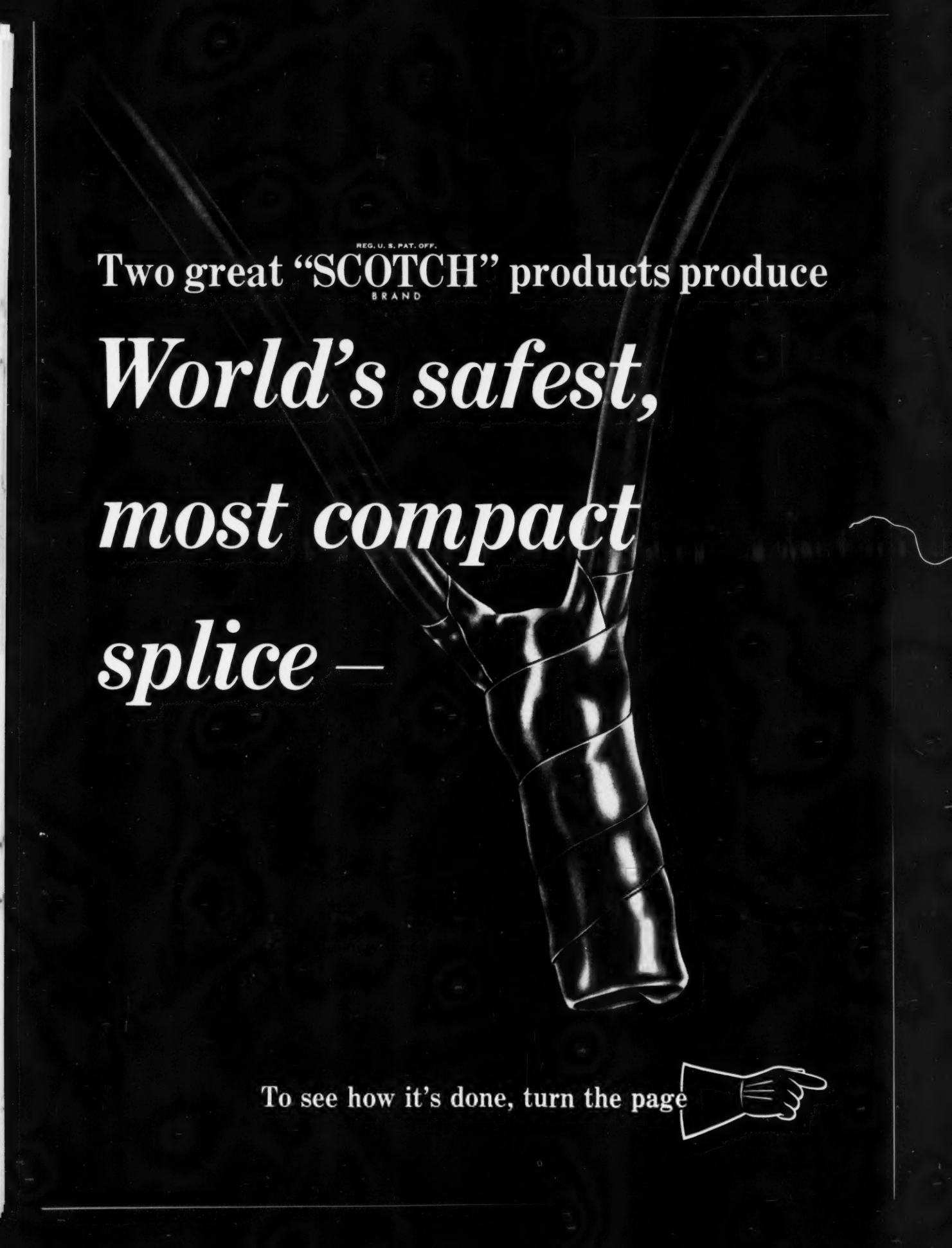
Main Office and Plant: HARRISON, NEW JERSEY

MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

REG. U. S. PAT. OFF.

Two great "SCOTCH" BRAND products produce

World's safest, most compact splice –



To see how it's done, turn the page

"SCOTCHLOK"
Electrical Spring Connectors

are the toughest, tighest-gripping connectors ever made. "Snap-off" winding stem for easy application. They will not shake loose, thanks to spring tension. Packed 100 to a box, 10 boxes to a carton.

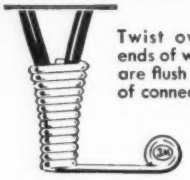
New 1-2 splicing method... easy, neat, efficient!

You'll get better work with this new twist in splicing — "Scotchlok" Electrical Spring Connectors—especially when you insulate the splices with the natural team-mate of "Scotchlok"—"Scotch" No. 33 Electrical Tape.

Together, these two "Scotch" brand products make the world's safest, most compact splice. It's a simple 1-2 method: twist on "Scotchlok", wrap on the tape.

Thousands of electricians are turning to "Scotchlok" all over the country. Order a supply today—do away with solder and crimping tools; get compact splices that won't shake loose!

1. Connect wires with "SCOTCHLOK" like this...



Twist over stripped ends of wires until wires are flush with small end of connector.

Pull winding stem downward to break it off easily. No soldering, no tools, no needless bulk!

2. Protect wires with "SCOTCH" 33 like this...

Make the "pants" by starting tape as shown. Bring forward between the wires and begin wrapping at the large end of "Scotchlok" connector.

Wind tape on connector until it extends ½ inch beyond small end. Fold the extension over and wind tape back towards large end. Quick and neat!

"SCOTCH"
Electrical Tape No. 33

is the plastic one-tape insulation. Excellent outdoor aging properties. In ¾-inch x 20-foot "Job Size" Rolls packed 12 to a sturdy screw-top container, and ¾-inch x 66-foot rolls in individual metal containers.

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

3M COMPANY

Pull Boxes

(20) Keystone Mfg. Co., Center Line, Mich.

Two types added to this manufacturer's line are the type A hinged-cover surface cutout box designed for electrical cutouts, signal, telephone junction and pull box applications, and the type SC, a screw-cover box designed for junction and pull box use. Hinged cover of the type A telescopes over the sides to keep out dust, comes in stock sizes ranging from 4½x5x3 in. to 24x18x6 in. The type SC is available from 6x6x4 in. to 18x12x6 in.

Motor-Mount Controls

(21) Furnas Electric Co., 1082 McKee St., Batavia, Ill.

Change in case design and use of two types of adapters makes it possible to mount starter or contactor directly to a motor quickly and at any motor position, the manufacturer states. These controls come in sizes up to 10 hp at 220/440/550 v polyphase in nonreversing and up to 7½ hp at 220 v or 10 hp, 440/550 v polyphase in reversing models.

Floor Furnaces

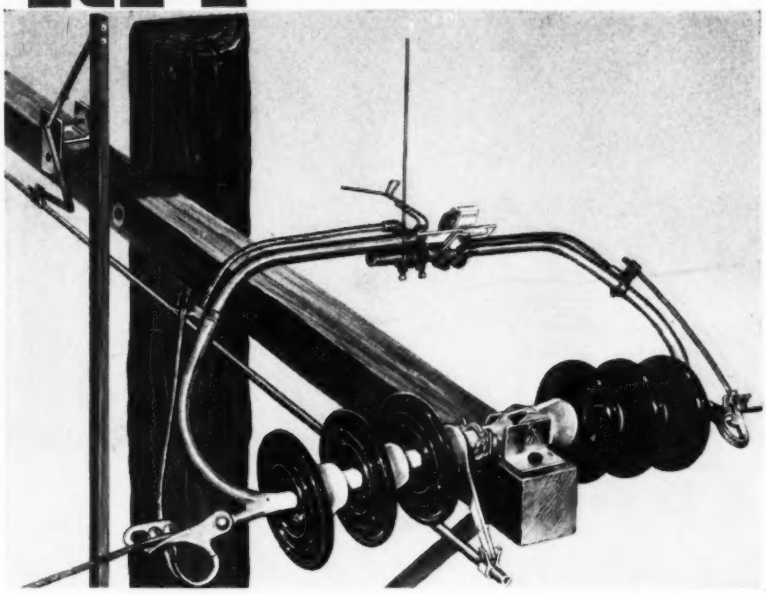
(22) Cavalier Corp., Chattanooga 2, Tenn.

Floor furnaces in 5- and 8-kw sizes have been added to the manufacturer's line of automatic electric heavy-duty room heaters. Depth of the heaters is 13¼ in. The 5-kw size can be installed between 16-in. joints; the 8-kw size is easily framed in, the manufacturer states. Two thermostats are built into the furnace and are protected by baffles designed to assure accurate temperature control. The automatic control operates on a 2° change in temperature.

(23) **DRIVE**—An electronic variable-speed drive for fractional horsepower motors has been announced by the Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn. It is described as a low-cost, packaged drive consisting of an electronic, adjustable-speed control unit driving a series motor and providing a wide, stepless range of speed control with good speed regulation under varying loads.

(24) **WATER COOLER** — A compartment-type bottle water cooler for offices and business places is offered by the Frigidaire Division, General Motors Corp., Dayton 1, Ohio. The cooler has a refrigerated storage compartment, with space for 35 6-oz bottles and will freeze and store two trays of ice. It can be plugged into any convenient electrical outlet.

KPF POLE TOP SWITCHES



Simple design means more switch ...for less money!

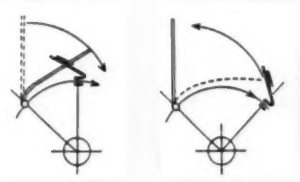
KPF Pole Top Switches cost less because they are simplest in design. They lower installation costs because they bolt on a single crossarm in minutes, require no extra insulators. KPF switches save, too, on upkeep; simple push-pull interphase rods never bind because of crossarm warpage; monel and bronze bearings never need lubrication.

KPF switches may be used in horizontal, vertical or triangular mounting. Free floating, self aligning blades and jaws maintain proper contact under all conditions of switch sag adjustment.

NEW QUICK-BREAK ATTACHMENT FOR KPF SWITCHES

The split-second breaking speed of these new KPF attachments means you can switch many circuits without using expensive circuit breakers. Attachment is available for all KPF switches rated 15 to 69 kv.

WRITE FOR DETAILS

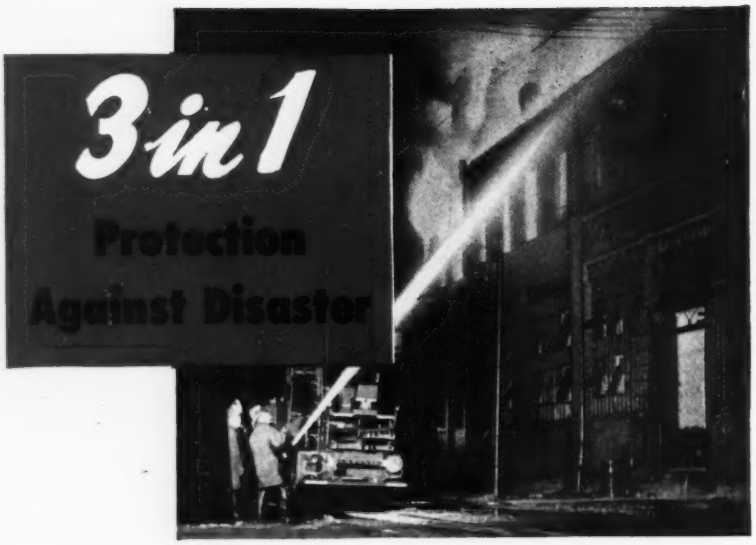


Spring rod winds to full tension as switch opens.

Rod springs clear, breaking contact at high speed.

KPF ELECTRIC COMPANY

1624 E. Alpine Avenue • Stockton 5, Calif.



APPLETON
Explosion-Proof Equipment

AA-51 Series Vented Type Explosion-Proof lighting fixture. Cooler operating ... easier to service.

1. **Cool Temperatures.** Appleton Explosion-Proof lighting fixtures operate cool enough to prevent igniting the gas, vapors or dust outside the fixture. Fluorescent fixtures operate at low, safe temperatures. Incandescent fixtures have full circle venting and porous metal interiors to disperse heat evenly and safely.

2. **Flame-tight.** Appleton Explosion-Proof MALLEABLE IRON conduit fittings and lighting fixtures are made tight to confine dangerous arcs, to prevent escape of flames or burning gases, or to cool escaping gases after an internal explosion. Flame-tightness is assured in that five full threads must be completely engaged before contact can be established. Accurately machined flat joints at cover openings assure perfect alignment.

3. **Explosion-Proof.** Appleton Explosion-Proof Equipment withstands at least four times the maximum possible internal pressures without bursting or loosening screws or joints. Fittings are made of unbreakable MALLEABLE IRON.

Type FSQX Explosion-Proof and Dust-Tight plug and receptacle with interlocking safety switch.

Type ARTC Explosion-Proof Tumbler Switch Unilet. Made of unbreakable MALLEABLE IRON, light and strong.

APPLETON
MALLEABLE
—IRON—
UNILETS

Type EFU Explosion-Proof fluorescent lighting fixture. Available for two 40 Watt, 48" lamps; or two 100 Watt, 60" lamps.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1709 Wellington Avenue • Chicago 13, Illinois

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

Sales Engineers in All Principal Markets

Laminated Plastic

(25) General Electric Co., Chemical Division, Pittsfield, Mass.

A flame-retardant laminated plastic with a consistency low 60-cycle power factor, designated G-E 11537 Textolite, is for switchgear, control equipment and other heavy electrical equipment where fire hazards exist and the mechanical and insulating properties of laminates are needed. The paper-base laminate will burn only at elevated temperatures and is self-extinguishing in one minute or less, the manufacturer states.

The new grade has good cold flow characteristics, low moisture absorption and retains its excellent electrical properties at temperatures up to 125 C, the manufacturer states. All thicknesses can be machined as well as conventional laminates not possessing the fire-retardant feature. Sheets up to one-eighth inch thick are said to have good punching qualities.

Light yellow in color, this laminate comes in sheets from .010 to 2.0 in. thick.

(26) **SMALL F STRIPS** — Midget fluorescent lighting strips are offered by Regent Savoy Electrical Mfg. Corp., 589 North Ave., New Rochelle, N. Y. They may be installed in horizontal or vertical positions, have keyholes for portable mounting.

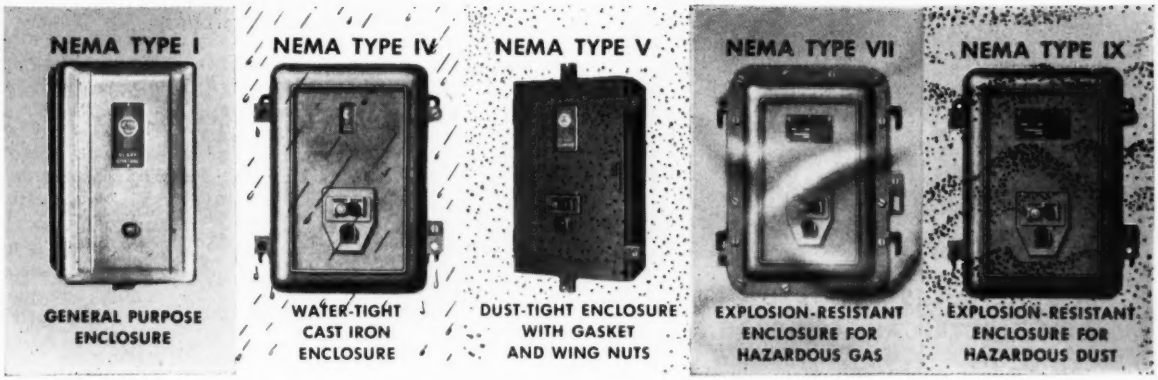
(27) **OVERSIZE PLATES**—Sierra Electric & Mfg. Co., 544 E. 31st St., Los Angeles 11, Calif., is making Jumbo wall plates for use where wall surface adjacent to a switch or outlet box has been chipped or damaged. They are similar in appearance and construction to standard plates but are 3½x5½ in.

(28) **BROODERS** — Infrared brooders with improved guards have been announced by Steber Mfg. Co., Broadview, Ill. The complete line consists of single-, three-, four- and six-lamp types, with or without guards, automatic thermostats, manually operated switches.

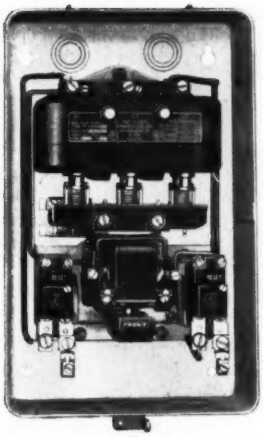
(29) **FANS**—Emerson Electric Mfg. Co., St. Louis 21, Mo., has announced additions to its line, including 16- and 20-in. electrically reversible window fans with shallow cabinets; 10- and 12-in. junior oscillators; large-volume 24- and 30-in. electrically reversible window fans; 18-in. Roll-about air circulator.

(30) **MASKING TAPE** — W. H. Brady Co., Chippewa Falls, Wis., has a line of Quik-Masks for use on anodized surfaces during high-temperature baking cycles. Material used in these new masks is Minnesota Mining & Mfg. Co.'s 214 paper masking tape.

(31) **ULTRAVIOLET LAMP** — A high-intensity ultraviolet lamp for installation in air-conditioning systems has been developed by the Hanovia Chemical & Mfg. Co., 100 Chestnut St., Newark, N. J. The Safe-T-Aire is designed to protect humans against infectious diseases and products against contamination.



for every operating condition
use CLARK TYPE "CY" STARTERS

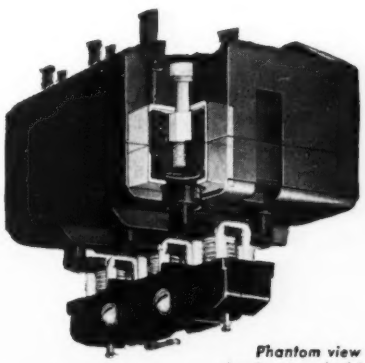


In every industry, including those where hazardous atmospheres prevail, CLARK TYPE "CY" STARTERS are giving utmost satisfactory service.

The incomparable new multi-turn magnetic blowouts combined with twin-break contacts, and the rest of the operating mechanism, are enclosed in types of cabinets to protect against adverse conditions or dangerous atmospheres.

Type "CY" starters, Sizes 2 and 3, employ an entirely new principle of arc interruption. The arc is extinguished by the effect of the blowout coil, concentric with the contact. The magnetic field quenches the arc either by lengthening or confining it. In its forced rotation it moves continually from a hot to a cold spot—minimizing burning or pitting of contacts. The ingenious design of the arc chamber prevents carbonization and the accumulation of hot gases between wiring terminals—minimizing phase-to-phase failures. Sizes 0 and 1 use the same general mill type construction as the larger sizes.

- **No filing, dressing or cleaning of contacts!**
- **No tools necessary to inspect contacts!**
- **Easy to change moving contacts!**
- **Stationary contacts changed quickly!**
- **Remove only two screws and one pin to change coils!**
- **Remove only four screws to take out stationary magnet frame!**
- **Power circuit contacts available with springs in complete packaged service kits for ease in stocking!**



Phantom view showing Arc-shield

***You'd better try* CLARK TYPE "CY"**

THE CLARK CONTROLLER CO.

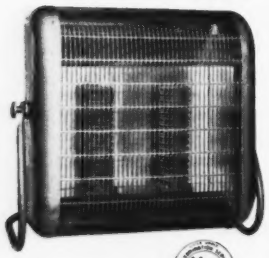
ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO

Modern Automatic heating at its finest..

MEMO: extra profits for electricians too!

A REAL SALES OPPORTUNITY FOR ELECTRICAL JOBBERS IN THE WEST

● Now you can offer your dealers outstanding products . . . consumer acceptance has been rapid—sales have jumped by leaps-and-bounds. Meier Nu-Air Wall and Portable automatic furnaces are beautifully designed and have the highest quality construction for "tops in sales appeal"



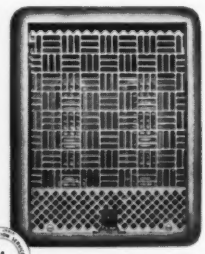
PORTABLE FURNACES FOR DIRECTED HEAT

Fully Adjustable
Adjustable over wide radius so that heat may be directed up or down at will.

THERMOSTATIC CONTROLLED AUTOMATIC HEAT

Radiates and Circulates
In addition to the radiant heat from the bright copper-clad reflector the Meier Nu-Air unit gives even, warm air circulation at the ideal velocity for quiet comfort.

A Size for Every Need . . . 5 Models!



SPECIAL FEATURES OF MEIER AUTOMATIC WALL FURNACES

Thermostatic Control
Built-in, sensitive thermostat automatically maintains the desired temperature in any room. Just set and forget it.

Radiates and Circulates
Even, warm air circulation, at the ideal velocity of about 200 feet per minute, plus radiant heating, gives gentle, quiet comfort without cold drafts.

Maximum Safety
An added safety feature prevents removal of the grille unless the switch is in the "off" position.

Easy to Clean
The grille is easy to remove for complete cleaning. Smartly styled to eliminate all "dust traps".

Manufactured by
MEIER ELECTRIC & MACHINE CO., INC.
INDIANAPOLIS 7, INDIANA
Famed for Dependability Throughout the World

TO: *The O. B. Wilt Co.*
Western Representative
1355 MARKET STREET
SAN FRANCISCO 3, CALIFORNIA
Please send me additional information on the Meier Nu-Air portable and wall-type automatic furnaces, and the availability of franchises in my trading area.

MY NAME: .....

MY COMPANY: .....

MY ADDRESS: .....

Deodorizing Lamp

(32) Sylvania Electric Products Inc., Lighting Division, 1740 Broadway, New York, N. Y.

A new high-ozone producing deodorizing lamp is claimed to consume only 4 w and to emit 40 to 50% more ultraviolet radiation than previous models. Greater efficiency of the lamp is attributed by its manufacturer to use of its bimetal switch, which automatically opens once the lamp has started, making it possible to send more energy through the arc. These lamps require no starters but operate off small choke ballasts.

F Fixture Has Adjustable Reflector

(33) Duro-Test Corp., 2321 Hudson Blvd., North Bergen, N. J.

Flexoliter is a new fluorescent fixture with five reflector positions. The flexible steel reflectors can be moved by the finger to secure: regular, 100% down; uplight, 20% up and 80% down; glare shielding, 40% up and 60% down; semidirect, 50% up and 50% down; indirect, 100% up. The fixture is made for both 20- and 40-w lamps in 20-gage steel with white oven-baked enamel finish.

Emergency Power Supply

(34) Electric Cord Co., 195 William St., New York 38, N. Y.

A new line of automatic emergency power systems use nickel cadmium batteries for emergency operation of lights, fire alarms and public address systems. Charging is automatic. These Light Warden units come in 6, 12, 24, 32 and 110 v with ampere capacity to meet specific requirements.

(35) **TRANSFORMERS**—A new line of encased dry-type lighting and general-purpose transformers is designed for 60-cycle operation; has Class B insulation. It is made by Universal Mfg. Corp., Paterson, N. J.

(36) **WATER FILTER**—A water filter that enables the user to secure mineral-free water from the kitchen tap is made by the Illinois Water Treatment Co., Rockford, Ill. The device is known as the Wantz water filter.

For manufacturers' bulletins with additional information on these products, fill in coupon on page 80

Here's the solution! AGP*...

Keeps all tap connections TROUBLE FREE

Chance Aluminum General Purpose Clamps solve the tap connection dilemma—eliminate confusion and the possibility of error in connector applications—reduce inventories—and greatly simplify stocking problems.

These new Chance multi-purpose tap clamps are the result of a newly-developed method of coating aluminum with a high-density fortified cadmium, which wards off corrosion and electrolysis in all types of connections.

The strong cast aluminum bodies are light in weight—easy on the conductor because they reduce conductor fatigue—easy to handle on a clamp stick. Contacts stay tight—the thermal expansion of the clamp is uniform with aluminum conductor . . . and since the thermal coefficient of copper is less than that of aluminum, the clamp will not deform copper conductor even under extreme temperature variations. The conductor is protected at all times.

Available in both the PC (Protected Connection) and Perma-Grip designs.

CHANCE *Aluminum General Purpose**

The Tap Clamp with the RED Eye Screw

ABC INDUSTRIES

A·B·CHANCE CO·

CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

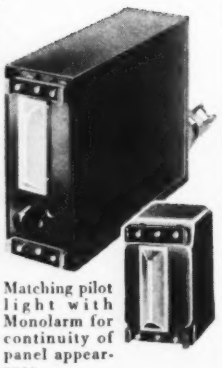
Announcing... R&S **Monolarm**®

CLASS I, GROUPS C & D, Div. 2

...the Compact signal alarm unit ideal for flow line and graphic panels!

Monolarm offers instant warning against any abnormality occurring in a processing operation. Should any abnormality occur the normal light ceases to shine...the alarm light flashes rapidly on and off...also an external howler, if used, is sounded. Acknowledgment by the operator must be made by turning the re-set switch . . . the alarm light then assumes a steady state until the condition is remedied...then Monolarm automatically resumes its normal indication.

• Write for Sales Data Sheet #21253 — 10



Matching pilot light with Monolarm for continuity of panel appearance.

Advantages of R&S MONOLARM

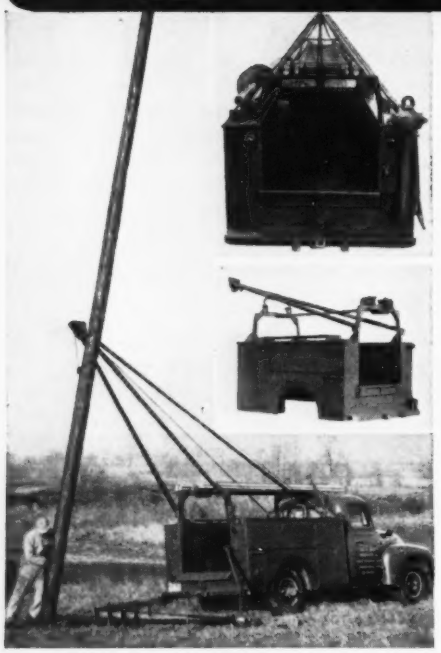
1. A single narrow bezel and button fits into a flow or graphic line diagram without interrupting the continuity of the design story.
2. Occupies minimum back-of-panel mounting space.
3. Lighting indications in two or three colors on *one* bezel.
4. Relamping is quick and easy from the front of the panel.
5. Instantaneous connect and disconnect of the power supply cable to Monolarm is provided by an interlocking switch receptacle and plug.
6. Hermetically sealed plug-relays instantly removable if replacement is necessary.
7. Time delay circuit available to counteract turbulence and vibration when abnormal condition is reached.

RUSSELL & STOLL COMPANY, INC. • 125 BARCLAY STREET, NEW YORK 7, N.Y.

RUSSELL & STOLL

PRECISION BUILT ELECTRICAL EQUIPMENT—SINCE 1902

Two-Man **COMBINATION TRUCKS** Pay Dividends



With a ¾ or 1-ton truck and Tel-E-Lect "Combination" Body, you can . . .

- Dig holes and set poles up to 40'
- Handle your regular service work
- Reach a variety of jobs quicker
- Operate with two men at less cost

IT'S A COMPLETE PACKAGE, tailored for your make and model of truck. Derrick, winch and digger drive are all assembled to the body, ready for your truck chassis. Easily mounted in a few hours by your local mechanic. ***Write for Bulletin***

Distributed by:
Am. Equipment & Body Co., Los Angeles 33
Schetky Equipment Corp., Portland 14

TEL-E-LECT
PRODUCTS, Inc.
10025 Minnetonka Blvd., Minneapolis 16, Minn.

BULLETINS ETC.

(37) HOME LIGHTING—Glatthar Lighting Co., 949 E. 72nd St., Cleveland 3, Ohio, is offering a 32-page illustrated catalog, printed in color. The line includes units for indoor and outdoor home lighting, with modern and traditional designs. Twin-light units for modernizing bathroom cabinet mirrors wired for one center light and an offset-stem bowl unit for living areas are among the new items listed.

(38) TIMERS—A bulletin prepared by Paragon Electric Co., Two Rivers, Wis., introduces its CR3MB-KT2 and JW timers and clarifies engineering information on the earlier CR series. The CR3MB-KT2 is a dual-range cycle repeater unit that consists of two electrically interlocked timers, one regulating the frequency of operation of the other. The JW series is a small, percentage-type, cycle repeater designed for permanent mounting and providing a range of adjustability from zero to 90% of the dial.

(39) COPPER AND BRASS PRODUCTS—A file-size bulletin listing nearly 70 catalogs and technical handbooks on copper and brass products is available from Chase Brass & Copper Co. Inc., 236 Grand St., Waterbury 20, Conn. Publications in the listing include descriptions of engineering alloys, bus conductors, wire, cable, magnet wire, tube and fittings for radiant heating.

(40) SOLENOID VALVES—Typical applications of solenoid electric valves for high-pressure lines are shown in a bulletin offered by Atkomatic Valve Co., Department 93, 545 Abbott St., Indianapolis 25, Ind. These valves are made in sizes from ½ to 1½ in. and for pressures to 3,000 psi.

(41) LIGHTING — A mailing piece on its Circline units, including a new three-lamp combination using a 16-in., 40-w, a 12-in., 32-w and an 8-in., 22-w instant start lamp, is available from Apollo Lighting Fixture Co. Inc., 214-218 S. 4th Ave., Mount Vernon, N. Y.

(42) CARBON BRUSHES—A 66-page catalog gives carbon brush replacement data, with replacement brushes listed under the appliance manufacturer's name as well as the motor manufacturer's. It is available from Becker Bros. Carbon Co., 3450 S. 52nd Ave., Cicero 50, Ill.

(43) MOTOR SHEET — Bulletin F 4271-2 describing unidirectional, reversible and synchronous shaded-pole motors for servomechanisms, domestic appliances, projection equipment, industrial instruments, etc., is available from Barber-Colman Co., Motor Division, Rockford, Ill.

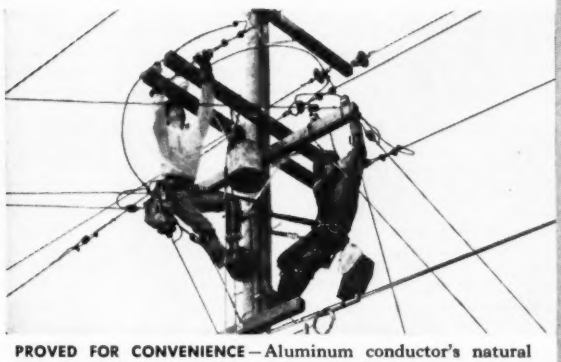
(44) HOOK-ON INSTRUMENTS—Applications, operation and basic features of its hook-on type AK-1A volt ammeter, AK-2 watt meter, AK-3 power factor meter are described in booklet GEC-901 from General Electric Co., Schenectady 5, N. Y.

For More Data
Fill in Coupon, Page 80

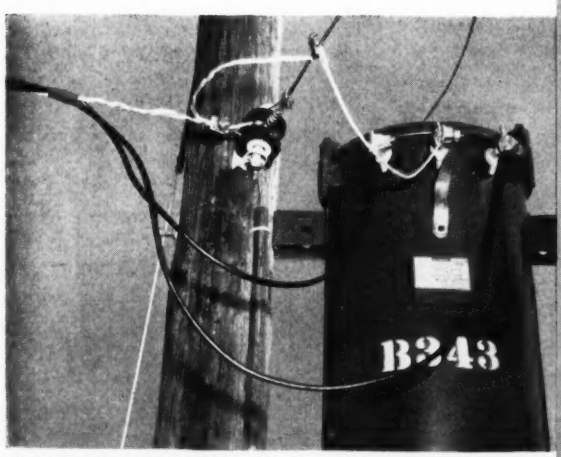
MAKE IT GOOD

WITH ALUMINUM CONDUCTOR

PROVED FOR SERVICE—Rapidly increasing usage of aluminum conductor for service drops, secondary and transmission lines is proof of its industry-wide acceptance. Proof that aluminum conductor is doing a good job under widely varied conditions.



PROVED FOR CONVENIENCE—Aluminum conductor's natural advantage of light weight makes it the first choice of many linemen. Aluminum strings faster, easier—saves installation time and money.



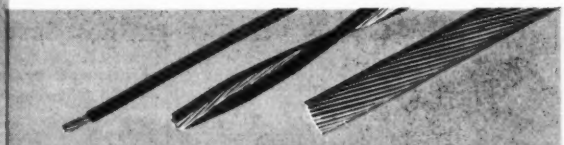
PROVED FOR SAVINGS—You get important savings *automatically* when you specify aluminum conductor. The initial cost of aluminum is far less than with copper. And easier handling is possible because of aluminum's light weight.

MAKE IT BETTER

WITH KAISER ALUMINUM CONDUCTOR

FIELD SERVICE—Kaiser Aluminum field men have a growing reputation for helping make better installations at lower cost. They pitch in and help on a job, use their long experience to devise cost-cutting techniques. They closely watch schedules to insure on-time delivery of Kaiser Aluminum conductor.

ENGINEERING AND LABORATORY SERVICE—Specialists from Kaiser Aluminum Engineering Service are available for meetings with supervisors and crews—often resulting in worthwhile savings, improved installations. Sag and tension charts are provided where necessary. Research problems are carefully studied by Kaiser Aluminum Laboratory Service—one of the best-staffed and best-equipped in the industry.



THIS COMPLETE SERVICE is available to you at no obligation when you specify Kaiser Aluminum conductor. *Act now!* Request free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable for service drops and secondary distribution lines. Contact any Kaiser Aluminum office in principal cities, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service

Neoprene and Polyethylene Covered Conductor, Solid and Stranded Self-supporting Triplex Cable • ACSR • All Aluminum Conductor

the Best
in safety... wearability
KLEIN-KORD

Count on being really satisfied with Klein-Kord *nylon* Safety Straps. They're smooth and flexible, require no special care—and give you that important extra margin of safety. Made of multiple plies of strong, finely woven *nylon*, bonded together with frictioning and vulcanized in neoprene. Red center is a safety signal to "Stop When You See Red!" Equipped with finest drop-forged hardware.

ASK YOUR SUPPLIER

Foreign Distributor:
International Standard
Electric Corp., New York

KLEIN *Nylon* CLIMBER STRAPS
for calf and ankle also available. Special straps furnished with rivets, burrs and punched for quick attachment to ring type climbers.

Write for your free copy of the Klein Pocket Tool Guide today!
"Since 1857"

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVE., CHICAGO 18, ILL.

(45) ELECTRICAL TAPES — Scotch brand tapes and related electrical products for construction and maintenance are described in a 12-page illustrated booklet offered by Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn. The booklet discusses use of plastic tapes Nos. 21, 22 and 33 in industrial and house wiring, appliance repair, underground cable splicing and other heavy-duty applications; tells how glass cloth electrical tape No. 27 with a thermosetting adhesive is used for sealing, holding and insulating where high temperatures are involved. Also described are accessory products such as electrical spring connectors for splicing, electrical insulation putty for insulating and padding large connectors and other irregular surfaces prior to taping, electrical coating for use as an outer seal on plastic tapes subjected to abnormal quantities of oil or contaminated water.

(46) CONTROLS—Allen-Bradley Co., Milwaukee, Wis., has released a 28-page bulletin, "Quality Line of Motor Controls for All Industries." The most important items in the manufacturer's line of standard motor control apparatus have been outlined. Controls, starters and accessories are described and their applications listed. A special feature is a section illustrating glimpses behind the scenes of the company.

(47) INDUSTRIAL LIGHTING—Bulletin 8 in the "See Better-Work Better" series is available from General Electric Co., Nela Park, Cleveland 12, Ohio. It describes the "revolution in industrial lighting," based on the concept of balanced brightness, as well as sufficient light, over the entire work area.

(48) REELS — Heavy-duty reels for handling drop wire, large coils of cable, etc., are listed in an eight-page catalog prepared by HyKon Mfg. Co., Alliance, Ohio.

(49) TROFFERS — Fluorescent lighting fixtures, troffer type for recessed mounting in acoustical ceilings, are described in a 12-page catalog from Gruber Lighting, 125 S. First St., Brooklyn 11, N. Y. The publication is designated Folio No. T-50.

(50) TIME-CYCLE CONTROLLERS — Information is given on application of these controllers in timing industrial processes. Bulletin C305 is available from the Bristol Co., Waterbury 20, Conn.

(51) INSULATION—Dow Corning Corp., Midland, Mich., is offering a bulletin on Silicone (class H) electrical insulation.

(52) MOTORS — A folder covering electric motors ranging from 1/30 to 5 hp has been prepared by Doerr Electric Corp., 100 N. Fourth Ave., Cedarburg, Wis.

(53) LIGHTING—Two- and three-lamp fluorescent luminaires for surface mounting are described and illustrated in folio S-50 from Gruber Lighting, 125 S. First St., Brooklyn 11, N. Y. Another recent bulletin available from this manufacturer lists more than 30 different types of fluorescent and incandescent fixtures.

(54) TEMPERATURE RECORDER — Bulletin 447 from the Foxboro Co., Foxboro, Mass., describes construction of these instruments, gives information for their selection and use.

(55) SERVICE STATION LIGHTING—A 32-page brochure offered by Guardian Light Co., Oak Park, Ill., covers horizontal and vertical F units for pump island lighting, sealed-beam spot and flood lampholders, reflectors, splice boxes and fittings, sign lighting units, brackets, standards, hinged poles and related equipment.

(56) COMMERCIAL LIGHTING — A 60-page catalog of commercial incandescent lighting has been released by the Art Metal Co., Cleveland 3, Ohio. It contains 47 new products.

(57) INSTRUMENTS—A data sheet covering its line of electrical measuring instruments is available from Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill. It is listed as bulletin 10AA.

(58) MOTORS — Bulletin 37-200 from the Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, describes large wound-rotor and squirrel-cage polyphase induction motors.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after June 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58

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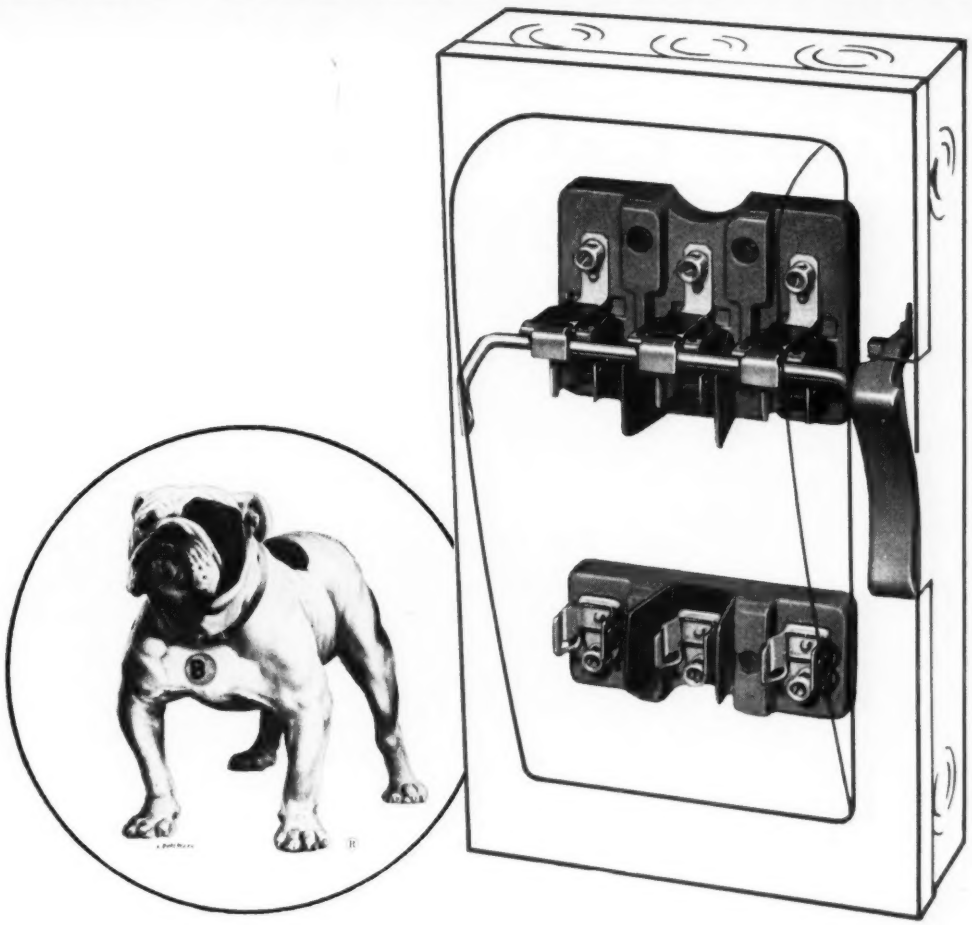
*Please include your company's name and your position, since we cannot ask manufacturers to furnish literature unless you do.

BULLDOG VACU-BREAK SAFETY SWITCH



It's a Thoroughbred--and Looks it!

A THOROUGHBRED — whether a dog or a safety switch — always looks the part because it's better on all points. In the BullDog Vacu-Break Switch — the thoroughbred of safety switches — the trim, functional exterior is the direct result of fine engineering and design of interior components.

LOOK INSIDE . . . and see how BullDog's exclusive Vacu-Break with its practical, compact design, gives you both extra safety and clean-lined tailoring. See how all parts and assemblies are engineered as a perfectly co-ordinated unit to assure maximum efficiency, safety and economy.

WRITE TODAY FOR FREE Bulletin B-250, and get complete details on BullDog Vacu-Break Safety Switches. BullDog Electric Products Company, Dept. EW43, Detroit 32, Michigan.

BULLDOG

ELECTRIC PRODUCTS COMPANY

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CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES

Coast Electric & Manufacturing Company
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BullDog Electric Products of Los Angeles
P. O. Box 7385, Lugo Station
Los Angeles 23, California

Young Electric & Manufacturing Company
2134 Curtis Street
Denver 2, Colorado

ELECTRA'S HUSBAND

A COUPLE of Saturdays ago Electra took me shopping for half a dozen or more items that were needed around the house. The experience was more discouraging than it was refreshing. Only once during three hours of visiting six or eight stores were we subjected to a real sales pitch. A vacuum cleaner demonstrator in a branch of one of the country's largest chains gave us a concise and complete sales story, even though Electra told him that she was satisfied and happy with her present cleaner.

In a couple of cases we were absolutely ignored, although there were salespeople around who obviously were not busy. I suppose they thought we were only "lookers." Even more disturbing than this, however, was the number who agreed with every criticism, question or complaint that we made about whatever piece of merchandise we were considering. Had a merchandising or sales manager overheard some of the conversations, I am sure that the ranks of retail salespeople would have been materially reduced before nightfall.

The experience brought to mind a survey and the attendant comments made about a year ago by the Grey Advertising Agency. Here are some extracts from candid tape recordings of sales conversations in the course of that survey that almost exactly paralleled some of the things said to Electra and me:

"Confidentally, I think our policy is screwy. But don't hold it against me; I don't make the policy. I just carry it out."

"That shipping department can make more damfool mistakes than you can shake a stick at. I'll raise cain with them."

"Those inspectors at the end of our production line must have been sound asleep when they passed that batch."

"I'll agree with you—that package is too big. But that's what they give me to sell."

Everyone who has any contact with salesmen can add to that list. Why is it, I asked myself, that salesmen occasionally sell their company short?

In analyzing the problem, the Grey Agency survey dismisses the possibility of disloyalty. Few salesmen are disloyal to their employer. If they are, they are found out and fired; or they quit of their own accord.

Rather than sell his company short and at the same time sell himself down, the salesman might better go to the other extreme, the survey says.

"If the salesman must err, it would be better to err on the side of fanatical defense of his company. But nobody likes a fanatic. And a salesman who refuses to entertain any complaints from the trade will not be calling on the trade very long. After all, no company is perfect. And the trade can't be that onery.

"Blind, unreasoning conformance with the 'company line' is as bad in business as it is in political ideology. However there is a wide area between the two extremes—between the extreme of heartily endorsing every complaint and the opposite extreme of bristling at any complaint. It's that middle area that smart salesmen find. And having found it, they learn how to thread their way through it in a way that wins respect for both the company and the salesman.

"It's a neat trick. It's a selling trick. Indeed it *is* selling—selling in its highest form."

When Electra and I were kicking this subject around, she offered a significant comment. She pointed out that some of the best salesmen any company has are the servicemen who come along to satisfy and correct complaints that the salesman refers to headquarters. And she ought to know—she sees enough of them.

HARD TO BUY HARDER TO SELL

ELECTRA has been collecting stories of government waste and red tape that she can send to our Congressmen as part of her program of hollering about taxes. She was particularly indignant about a case cited by the U. S. Chamber of Commerce.

It seems that the Chamber of Commerce of the U. S. publishes a 61-page booklet on workmen's compensation laws. Anyone can secure a copy by sending in a request and one dollar. It's that simple.

Well the Air Force wanted a copy and submitted an order that replaced simplicity with General Red Tape. The paper work necessary to process the Air Force's order still has heads spinning.

To cover the purchase the Air Force sent a contract numbered AF 33(602)-3140 Class 30 D. The order said payment was to be made out of allotment 5733400 363-1813 P422. (29)-08 S33-602.

But that was only the beginning. With the order the Air Force sent the following:

A four-page contract in fine print (20 clauses and 43 paragraphs) that stipulated—among other things—that its copy of the booklet must not be manufactured by convict labor. A four-page set of additional contract provisions (12 clauses and 56 paragraphs) in even finer print, providing for termination of the contract at the convenience of the government, and telling how to ship the booklet by freight car. A proviso for labor disputes was included together with a citation of the Neutrality Act of 1939. A page of special provisions, which included a reminder that the $1 purchase price was subject to renegotiation. Two more sheets with additional clauses and two copies of a mimeographed acknowledgment.

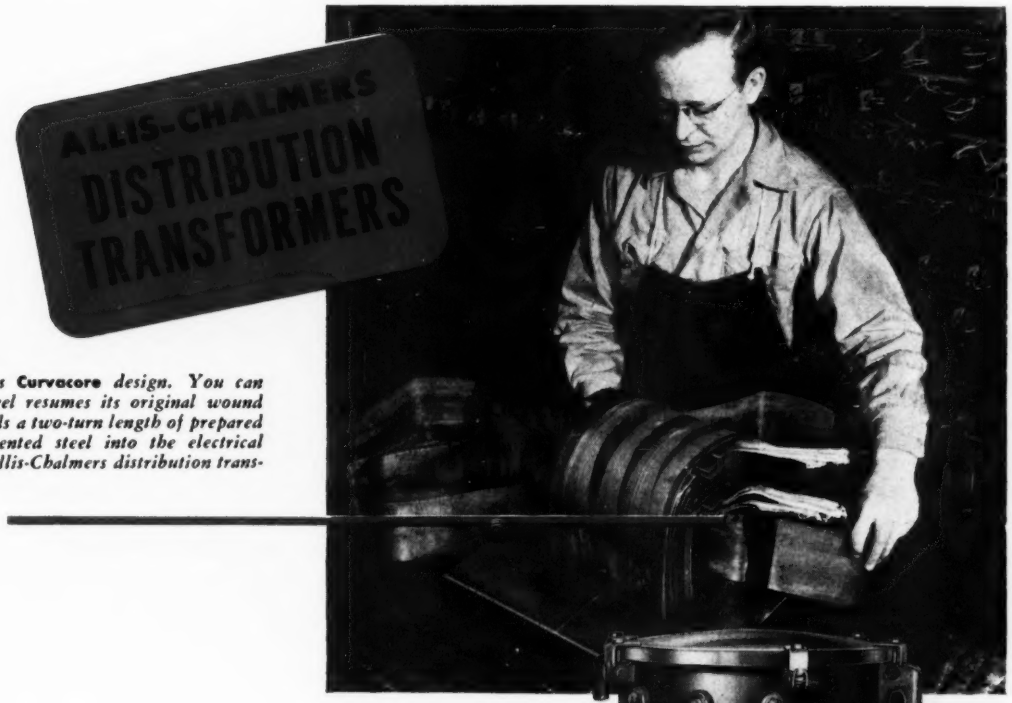
Last year the Chamber received a similar contract from the Air Force when it requested a 50-cent booklet.

Like Electra, other tax payers may wince, not smile, at this story for it is an extreme example of how many millions of their dollars are spilled into the waste trough.

Even though it recognizes that it is poor business to give away your product, the Chamber sent a free copy to the birdmen with this note:

"It appears that the price involved would scarcely justify the study and negotiation required in the contract attached to the letter. We therefore request that you please accept this copy without charge."

How CURVACORE Design Improves Transformer Performance



Picture illustrates **Curvacore** *design. You can see how core steel resumes its original wound shape as man feeds a two-turn length of prepared cold-rolled, oriented steel into the electrical windings of an Allis-Chalmers distribution transformer.*

Results in Low Exciting Current . . . Low Losses

Curvacore design fully utilizes the advantages of cold-rolled, oriented steel. First, steel is wound from a continuous strip of steel, shaped and annealed. The annealing process relieves mechanical stresses and sets the shape of the core. Then core steel is unwound, cut into two-turn lengths and nested in proper order for assembly around the coils.

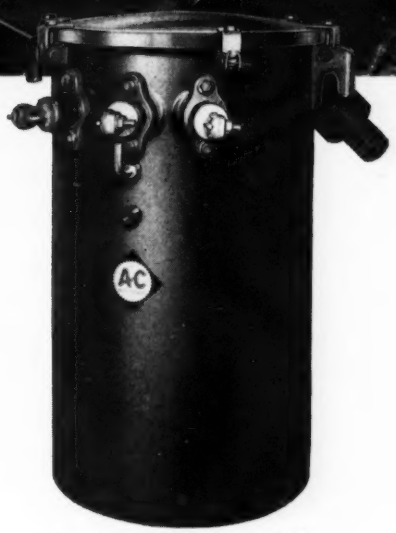
Curvacore design permits the flux path to follow the grain of the steel. This results in high permeability, low hysteresis losses and a mechanically stronger core structure of less weight than previous design.

Better Regulation and Cooling

In addition, coils are arranged in low-high-low sequence which gives lower impedance resulting in better regulation characteristics. Liberal cooling ducts provide large contact areas between windings and oil to keep copper-to-oil gradient low.

As a result of careful design and manufacture, you get a compact, efficient transformer. And you get extra features like improved impulse strength, sealed tank construction, and excellent surface protection. For complete details, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4024



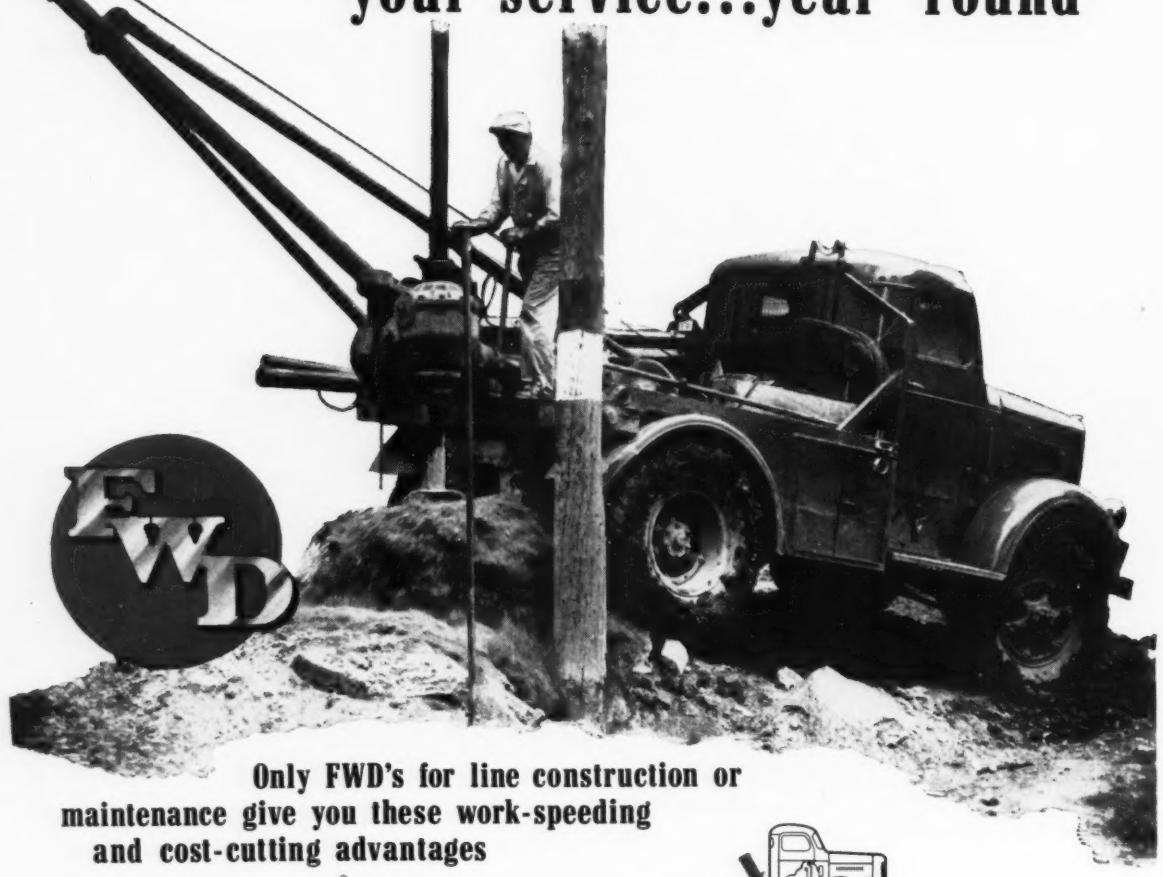
Curvacore *design is available in most distribution ratings.*

Curvacore is an Allis-Chalmers trademark.

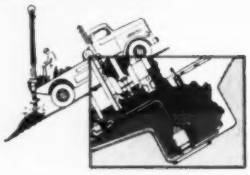
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

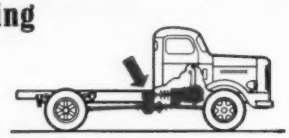
FWD "Mobilized Tools" improve your service...year 'round



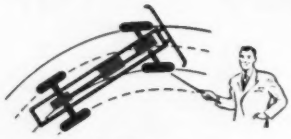
Only FWD's for line construction or maintenance give you these work-speeding and cost-cutting advantages



High-Climb Oil Sump keeps oil pump constantly submerged. An FWD exclusive that lets you bore holes, set poles on steepest grades or slopes.



Two-Speed Aux. Transmission
Doubles the number of transmission gear ratios. Provides low gear ratio for full power at extreme low speeds in tough, cross-country operations.



Fully Compensated Drive
Three free-acting differentials compensate for differences in travel of all four wheels. Reduces drive line strains, eliminates needless tire scuffing.

Full Torque P.T.O.... Utilizes full engine power through all transmission speeds. Exclusive safety lock prevents truck drive while boring.

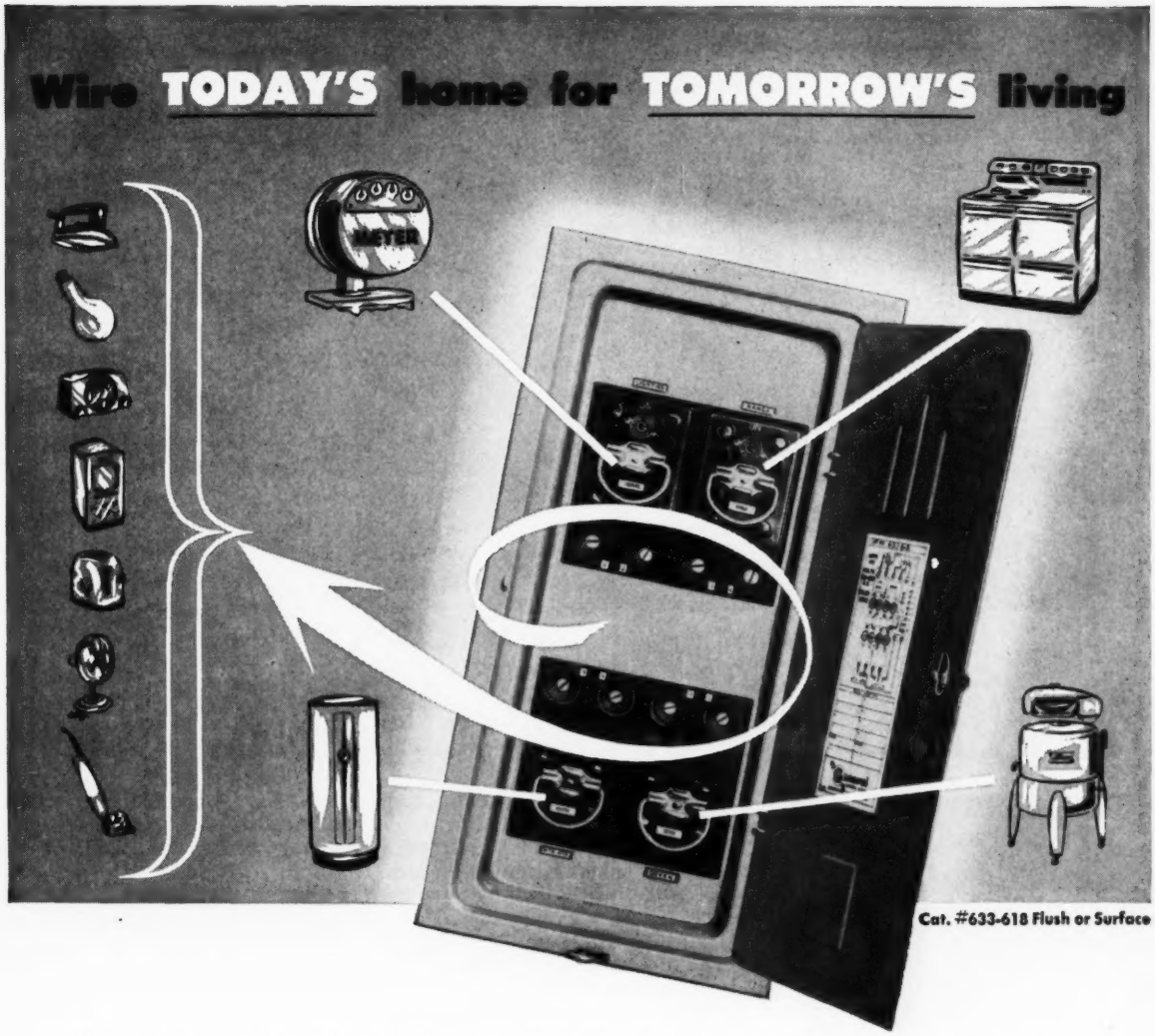
With extra traction and "go everywhere" mobility FWD "Mobilized Tools" for line construction or maintenance pay off for you in speed . . . to the job . . . on the job. And, you'll get all-weather service . . . greater safety for crews and equipment . . . longer, trouble-free life. When you use FWD "Mobilized Tools," you deal with only one source for service and supply.

To get the facts . . . details on the more than 78 matched-combinations utilities can choose from . . . see your FWD Dealer or write direct.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wisconsin • *Canadian Factory*: Kitchener, Ontario

Built by the makers of America's Foremost Heavy-Duty Trucks

Wire TODAY'S home for TOMORROW'S living



Cat. #633-618 Flush or Surface

General brings you a "Main and Range Plus"! The *quadruple* pullout unit that actually plans for the future. Not only does this all-in-one unit take care of today's wiring requirements . . . it *anticipates* tomorrow's needs. Eliminates costly auxiliary wiring equipment, and unsightly additions. The General Quadruple Pullout unit is neat, compact, thoroughly dependable. It saves you time and materials . . . at a price you want to pay. No wonder wholesalers and contractors all over the country are saying: Switch to General today! Available everywhere exclusively through wholesalers.

100 Amp. main lugs feed 4 pullouts connected in parallel. One 60 Amp. functions as a main disconnect for eight 30 Amp. plug-fuse branch circuits and the 60 Amp. sub-feed lugs. Three additional pullouts (one 60 Amp. and two 30 Amp.) control appliances such as, Ranges, Water Heaters, Dryers, etc. Other combinations may be ordered.

Sales Offices in every Major City

General Switch Corp.

Write for catalog #5201

45 ROEBLING ST. • BROOKLYN 11, N. Y.

ENCLOSED SAFETY SWITCHES • SERVICE ENTRANCE EQUIPMENT • BRANCH CIRCUIT PANELS

Consistent MPA supporter, Connecticut Light and Power, has nearly every program. Here Vice-Pres. Robert G. Ely and Industrial Sales Manager Howard W. Memmott discuss new uses for the Motor Selection and Application Course.

Is your utility putting MPA to work in

EXPANDING THE USE OF ELECTRIC POWER

"Freedom and Power" wins award: Certificate for outstanding film achievement is presented by Gardner Cowles (left), editor of Look magazine, to J. Stanford Smith, Chairman, MPA Committee.

More than 100 of the nation's leading electric utilities are now using General Electric's More Power to America programs as vital components of their power sales and community development activities.

Specifically designed for the industry, these packaged promotional programs represent the co-operative best thinking of electrical and machinery manufacturers, application and consulting engineers.

Each of the 27 programs dramatically portrays the latest in electrical ideas ranging from Materials Handling to Sewage Treatment.

Utilities of all sizes are placing increasing emphasis on MPA's creative, mass-selling methods. Many purchase every program—with nearly 2000 kits now in use. To learn how MPA can help stimulate your sales program contact your Apparatus Sales office or write for MPA catalog GEA-4938. General Electric Co., Schenectady 5, N. Y.

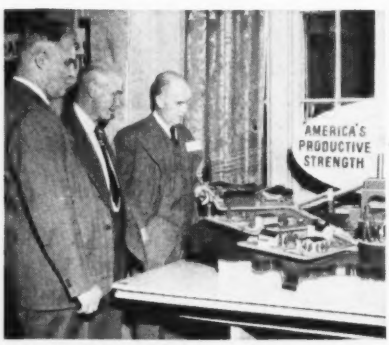
1878 75 1953 YEARS OF ELECTRICAL PROGRESS

301-218

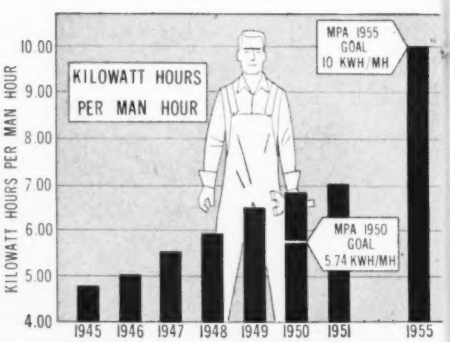
More Power to America

GENERAL ELECTRIC

One of the most spectacular MPA promotions was the "More Power to America" Special Train. Featuring over 2000 electrical ideas, train visited 163 cities. It was inspected by 259,733 people.



Industrial Productivity Forums are an important, co-operative MPA activity. Fred Allen and Clarence Gregg of New York Central inspect an exhibit with Ralph Wagner of Niagara Mohawk Power Co.



More kilowatt-hours per man-hour has been consistent goal of MPA. Results have so far exceeded expectations. Goal for 1955 is 10 kw-hr per manhour—almost double the figure set for 1950.

APRIL 1953 Vol. 110, No. 4

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

Use the sales manual and manufacturers' materials, instructor tells class. All appliances are ready for action as well as display

Sales Acting Builds Selling Action

Jack L. McDonald Director of Special Services Arizona Public Service Co.

All honor to those companies and services that have produced sales courses! The tools that are drawn annually into the field of selling have long provided a stepping stone for the dedicated but unimaginative sales manager and, because of these men, let packaged sales courses continue in production.

Certainly we need all the help that can be mustered into the sales field. The bountiful years of pickup buying rather than shopping-selling have given older salesmen a Rip Van Winkle rest and newer salesmen some bad habits. We have arrived at a place in American progress, however, where we can not afford to lose either type of salesman.

Saleswise, Arizona Public Service Co., serving a 37,000-square-mile area in this Western state, has for the past three years produced an aggressive sales program. This has entailed more than a passing attention to the sale of appliances by dealers in the company's area as well as the sale of dependable utilities to the consumer.

The Editors
Electrical West
San Francisco

Gentlemen:

We have something we believe to be NEW in sales training here in Arizona. It is a local course that can be adapted to fit any locality. The parts played by the manufacturer, the distributor, the dealer, the utility and the appliance association have been interwoven by Jack L. McDonald into a straight selling course that is producing results.

The methods are easy to follow, if the student applies himself; the results are assured, because aggressive sales action coupled with human relations can not fail to win customers.

To my best knowledge, this is the hardest-hitting, action-packed sales course I have experienced. These opinions are shared by the students who have graduated and by the dealers who employ them.

E. W. Cowdry
Manager
Appliance Merchandisers Assn.

Having brought into focus the need for well-consummated sales, the company has built up a strong, integrated force to promote the sale of appliances and equipment that will use the utility's services and to assist its sales allies in promotional efforts on a fair and impartial basis.

In planning the 1953 sales program, it was long realized that a program of effective sales training would back up the general sales program in an effort to give necessary help to dealers in getting their share of the customer's dollars.

Toward that end a packaged course was secured from Edison Electric Institute. This provides six films and records, and offers the tried and found true themes necessary in teaching sales.

But the resemblance of the Public Service sales course to others ends there. Something new has been added to the general story, and we believe that it is important enough to be of real assistance to any business wishing

Salesmen must learn decision making to handle situations like this where two salesmen are confronted with four sets of customers

to give vitamin B-1 to its sales program.

The Public Service course is not a lecture course. It is designed to give the salesman an opportunity to participate and to act out and bring to a successful conclusion actual selling principles and problems.

In dramatizing selling, the dealers' problems are brought into objective range. The strength and weakness of the individual salesman is revealed as he operates on the platform. A feeling of fellowship is injected early into the course so that each student performs with the knowledge that he is not being held up critically before his fellows, but is being given the opportunity to abolish the points that cause him to lose sales.

The course is presented in six meetings, each lasting one and a half hours with a five-minute break midway in the meeting. This instructor is of the opinion that such classes are more beneficial when held first thing in the morning. Dealers have cooperated in giving time to their salesmen to attend the course.

Situations are presented the first morning that require the students to go into action immediately. This gives the instructor the opportunity to observe glaring inadequacies in the salesman's make-up. Such failures may be the simple greeting of customers, lack of enthusiasm and vitality, poor knowledge of product or being in the dark about installation and operating costs. Sales students will take turns during the course at first enacting the roles of customers, and following the next day as salesmen.

In this cross acting, the salesman is brought into an observance of his customers and himself. The problems of the customer start showing on the platform because actual day-to-day complaints from real experience start being dramatized. The failure of a salesman to greet another properly in the role of a customer sharpens the courtesy wit of each participant.

"Sales Acting" is the description we have coined to cover the profitable antics through which our students pass. Every phase of the sales pitch, the signing of contracts, the demonstration of equipment and other activities, is covered.

Motives occupy the first lesson. These motives are pictured in the EEI film to reacquaint salesmen with the reasons people buy. The class then works to arouse these motives and make them visible on the platform.

The next session is one that we have found to be the most revelatory. In this, the instructor assumes the role of psychoanalyst. Paper and pencils are passed out; each salesman is instructed to answer several questions, but not to sign his name to his paper. The first entry is: "The Appliance I Like Best to Sell." This statement is followed by the reason why, and is backed up by direct statements showing the sales points used in making sales.

Now the papers are gathered and shuffled and passed out again. Salesmen take the paper that comes their way, spend five minutes with it, and then take the platform to sell with another man's sales story. This creates an awareness on the part of the salesman of observing good methods and putting them to work.

The third session deals with product knowledge. Appliances (and these are ready to operate, not merely displayed) are explained forward and backward. Students see that inability to explain setting a range clock may cost precious time and embarrassment on the sales floor, and find themselves eager to learn more about equipment. Students go to the appliance, examine it, and ask questions that are answered by a qualified home economist. Questions that have no answer are referred to an authority until answers are forthcoming.

Apathy toward certain appliances is dissolved during the demonstration period. Dishwashers, disposals and table appliances, which had been neglected at the beginning of the course, now became stress items with our salesmen because they realize here is a market that offers less saturation and more sales.

With orientation, motives and product knowledge absorbed, and with our company's home service, adequate wiring and lighting departments giving assistance as they are called on, our students now enter a session on demonstration. This includes arrangement of appliances on the sales floor, window displays, coordinating floor and window displays to current magazine, news, radio and television advertising, and then to actual demonstration of the appliances on the floor.

The old adage "We learn to do by doing" is shown effectively by salesmen who are now using information at hand, aggressive but human methods, and finally being able to ask for sales. They have learned how to close a sale properly and have been given a technique that provides a neat, businesslike spot for the signing of orders and contracts, and the admonition that the smile that broke over the salesman's face with the sale be

Seating the customer and making him at ease is one axiom in selling major appliances

Stock the freezer for most effective selling

continued when the customer has signed the contract.

Something different has been given them in sales technique in the form of sit-down selling, too. This brings into the sales picture chairs for the customers. Instead of leaning over the equipment, or peering into it with discomfort, the customer is invited to look into the range or the washer as if he were watching a television program.

The salesman shows himself to advantage with this method. He is taught stage presence and gestures that enable him to display the equipment to best advantage. Our humorous motto during this session is "Every salesman a Betty Furness."

During the fifth session, the students enter into a discussion of local service problems and operating costs. Expense to the customer in the installation of electric ranges or automatic washers and dishwashers is discussed in open conversation. The need for advising the customer early in the sales story is given and a better means of explanation is dramatized. Utility rates are explained by a rate department representative; a typical consumer bill is drawn and the greater use, lower cost story is proved.

For the final day, students learn how to turn suspects into prospects for appliances. Newspaper columns open the way for sales. One of our former students recently telephoned to say that she had sent congratulatory letters to new mothers when their babies were announced and that she had sold two automatic washers as a result of her thoughtfulness.

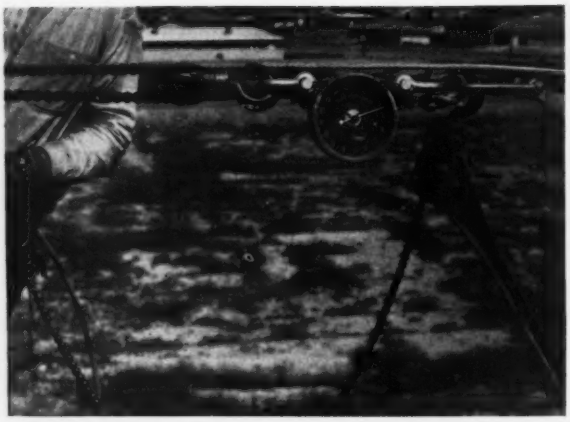
An awareness of the customer's needs is instilled to the point where congratulatory notes, phone calls or special services become a part of the salesman's ability to build sales. During this session, we learn too that the materials sent out by the manufacturer and distributor are of no use unless they are set up and displayed properly. We learn that if our stores use the helps that are provided by the manufacturer sales result. A bundle of pamphlets or recipe books do no work on a dusty table; mailed to prospects or handed to customers on the floor, they become winged messengers and sales hopes.

This course is doing a job for Arizona. We have at present graduated more than a hundred salesmen from the course and our appointment book is filled to take the course to more central Arizona salesmen and to spread out to the ten counties served by the company. Salesmen in fields of selling other than appliances have asked to come on board. We feel this is a hopeful sign that salesmen are awakening to the important part they play in maintaining America's economy and in creating enthusiasm for better living.

For in the long run, it will be the vitamin-packed story told by salesmen that will keep business growing rather than leveling off. This course has turned out some top salesmen and has revealed to weak ones that training and follow-through is necessary in producing sales results.

Sales acting in Public Service is producing *selling action*. Let the curtain go up on greater sales for your area by letting your salesmen see their sales through their own eyes.

Customer comfort and environment are important when it comes to preparing contract



1 Dynamometer is used to pull ACSR messenger for aerial cable to an initial tension of 2,600 lb. When dead end is made up on universal dead end clamp final tension is 2,000 lb. Tail piece left on messenger is looped around pole, grounded to guy wire

They Spin Their Own Aluminum Cable

Secondary aerial cable has the advantage of neat appearance, less voltage drop and prospect of worth-while economies in both labor and material

T. A. Phillips
General Superintendent
Arizona Public Service Co.
Phoenix, Ariz.

Growing copper shortage, sightliness and the prospect of over-all economy were the principal factors that led Arizona Public Service Co. to adopt a field-spun aluminum secondary cable as standard urban construction. The cable differs from earlier experimental installations on the West Coast in that an ACSR cable is used as both messenger and common primary and secondary neutral. During the year the cable has been used in Arizona no appreciable savings have been made in either material or labor because of the experimentation that has been necessary with clamps, fillings, hardware and construction methods.

Greatly improved appearance has been the principal advantage so far but the company feels that the bold venture has been well worth while on this score alone. Use of triplex all-aluminum service cable with the mid-span taps, made possible by the secondary cable, has eliminated crossing adjacent property with service wires and been a big factor in cleaning up poles and contributing to over-all neatness. The best way to give those interested in this new type of construction the information they will want is to give a step-by-step description of a job to tie in with the accompanying ELECTRICAL WEST staff photographs.

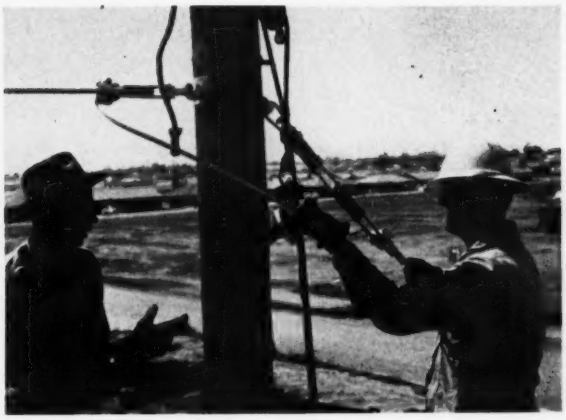
1. Messenger Stringing—The messenger used is a 101,800 cir mil cable (petrel) consisting of seven strands of steel and 12 strands of aluminum. Diametic is .461 in. and breaking strength 9,860 lb. Conductivity is between No. 2 and No. 3 copper. Span lengths up to 225 ft have been used with the average span running about 200 ft. For deadening the messenger OB universal strain clamps, No. 78,-500 or equivalent as shown are used. The messenger is pulled initially to a tension of 2,600 lb by means of a dynamometer so that after make-up of the dead end the tension will be not lower than 2,000 lb.

Since the messenger is a common primary and secondary neutral it was deemed advisable to secure as many multiple grounds as possible. Accordingly, at dead ends the tail of the messenger is cut long enough to pass to the side of the pole and is fastened to the ground guy by means of an all-aluminum single-bolt clamp, and is greased and taped. The grease or antioxident presently being used is Calol furnished by the Standard Oil Co. Messenger height is 28 ft.

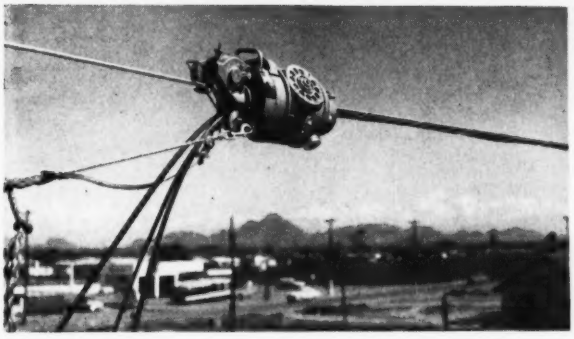
Considerable experimenting has been done with suspension clamps for the messenger on poles in the run. The best clamp found so far is an Ohio Brass product no longer made. It has a 6-in. open saddle into which the messenger is laid and then secured with two J-bolts. Suspension is on the threaded end of a projecting through bolt, as shown. With this type of clamp it is a simple matter to lift the messenger out of the saddle while the spinner passes.

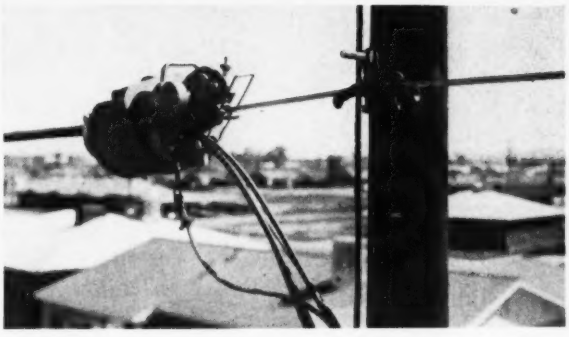
If the spinning wire is allowed to run out midspan, a man goes up on a truck-mounted ladder to reload the reel. Instead of attempting to splice the spinning wire, the ends are secured to the messenger with single-bolt clamps.

2. Cable Spinning—The next step is spinning the cable. A Neale spinner Model D, Catalog No. 300, made by the Cable Spinning Equipment Co. of Topeka, Kan., is used. Only one reel is loaded with the spinning wire which gives a 13-in. pitch to the turns. This long spiral is used so that the insulated wires can be pried apart to tap on the services. Two sizes of spinning wire have been used. One is the No. 5A wire .061 in. in diameter that will spin about 500 lineal feet of cable. The other is the No. 12A wire .091 in. in diameter that spins about 300 ft of cable. The larger diameter wire will have less tendency to cut into the neoprene insulation of the wires, but it has the disadvantage of being stiffer and harder to handle in



The strip of four pictures at top shows making the initial pull on messenger with dynamometer reading 2,600 lb; dynamometer reads 2,000 lb after make-up of dead end; tightening dead end clamp; cinching up ground clamp on common primary, secondary neutral

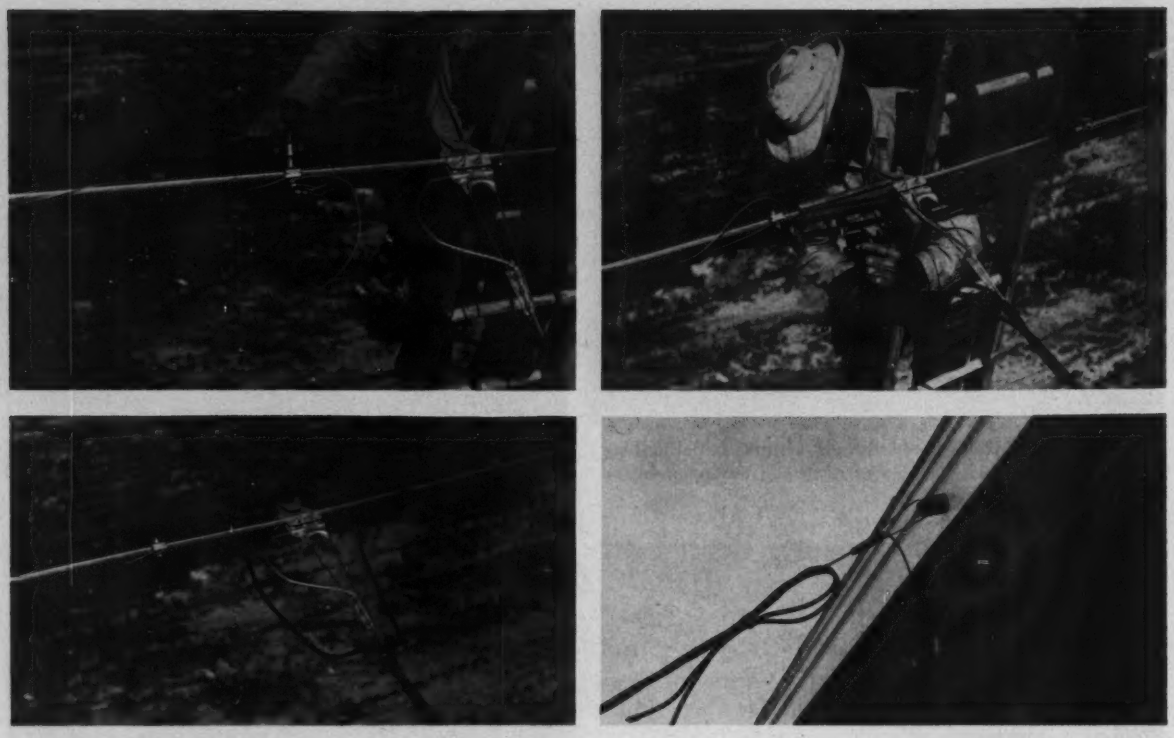




2 Aluminum secondary cable consists of 101,800 cir mil ACSR messenger-neutral with two 1/0 and one No. 2 all-aluminum neoprene covered wires spun into cable with Neale spinner. Last, shows type of J-bolt saddle suspension clamp for ACSR messenger

the mechanisms of the spinning machine. Moreover, it binds the cable so tightly that it is necessary to cut the spinning wire and clamp it to the messenger on either side of a service connection. Because of this it has been decided to use the No. 5A wire only even though it has the disadvantage mentioned. Pull on the small spinning wire is 10 lb, which makes a nice cable and yet is loose enough so that wooden wedges can be used to separate the conductors and make service wire connections.

Three types of cable are spun. One consists of two 1/0 and one No. 2, aluminum conductors with a 5/64-in. neoprene insulation. With neutral, this makes a four-wire 120/208-v three-phase cable for home air conditioning systems and for small commercial power loads. Two sizes of single-phase cable are used, one with two 1/0 and one with two No. 2 hot legs. These are equivalent to No. 2 and No. 4 copper respectively. The neoprene insulation on one of the lighting legs is ribbed to facilitate identification in balancing two-wire services.



3 Service connections. Spinning wire is cut and clamped to permit wires to be spread apart. Wooden wedge and plastic sleeve are used in making hot taps. New clamp makes neutral connections and holds dead end bail. Last: House end of service cable

3. Services — Tapping off services has been a problem that has received a great deal of thought and experimentation. An automatic dead end with flexible bail cannot be used because the bail wire would cut into the aluminum of the messenger. Armoring the ACSR is not considered practicable. Up until almost the day these pictures were taken the practice had been to use a stiff-wire bail automatic dead end and place the bail around a single-bolt clamp that made the connection between the triplex service neutral and the messenger neutral. If two services are taken off in opposite directions, the two bails were looped in such a way that they could not slip off the clamp.

This type of dead end for the bare aluminum service wire neutral, however, was not considered all that could be desired and L. A. Mincks, service supervisor for the utility, undertook to design a clamp that would meet all the requirements. After several modifications to lower manufacturing costs, he came up with the clamp as shown in one of the photographs. As may be seen, this is a two-part riveted clamp with a groove for the messenger, a groove, split, in the center, for clamping of two service wire neutrals, and two ears for the bails of the dead-end clamps. Engineers on the Coast might not consider this type of clamp suitable for corrosive atmospheres, but in the dry climate of Arizona it is felt that it may be the answer.

For connecting the hot wires of the service to those of the secondary, plated, split-bolt connectors are used. The "bugs" are then wrapped with varnished cambric for mechanical protection as well as added insulation and taped with Scotch electrical tape. At the house end of the No. 4 triplex aluminum service the neutral is dead-ended on a screw knob of the Pierce, Hubbard or other type. Connections to the copper service wires are made with two-part split-bolt connectors. No grease or antioxident is used on the connections at either end of the service as no trouble is expected in the dry Arizona climate. For getting up in the air to make connections to the aerial cable an extension ladder is used, as shown.

Arizona Public Service is well satisfied so far with its venture into a new and probably coming use of aluminum in distribution practice. There have been many problems and they are not all solved, but with the progress the manufacturers are making on the connector problem and the cooperative spirit of linemen, foremen and supervisors in working out field problems, it is felt that all the bugs will soon be worked out. Then, it is expected that secondary cable construction may show worth-while savings in both labor and material, besides having the sightliness and other advantages above mentioned.

4. Lower Reactance — With this type of aerial cable there has come a collateral advantage, that of lower reactance. If fully evaluated this might well justify secondary cable even if costs were considerably higher than for racked or crossarm construction. With the lower reactance of the cable, about 50% less than for open wires, voltage drop is less, the flicker voltage problem is minimized and the customer has better regulation and higher average voltage. Customers' equipment — incandescent lamps, heating devices, etc. — all perform better and at greater efficiency and nearer rated wattage.

When it is considered that the distribution engineer is dealing with the highest increment cost of the utility's product anywhere between the generator and the customer's meter, it would be well to scrutinize carefully distribution losses and maintenance of standard voltage at the customer's meter. A gain of 1% efficiency on the distribution system is roughly equal to 4% at the generating end. It deserves a lot of thought!

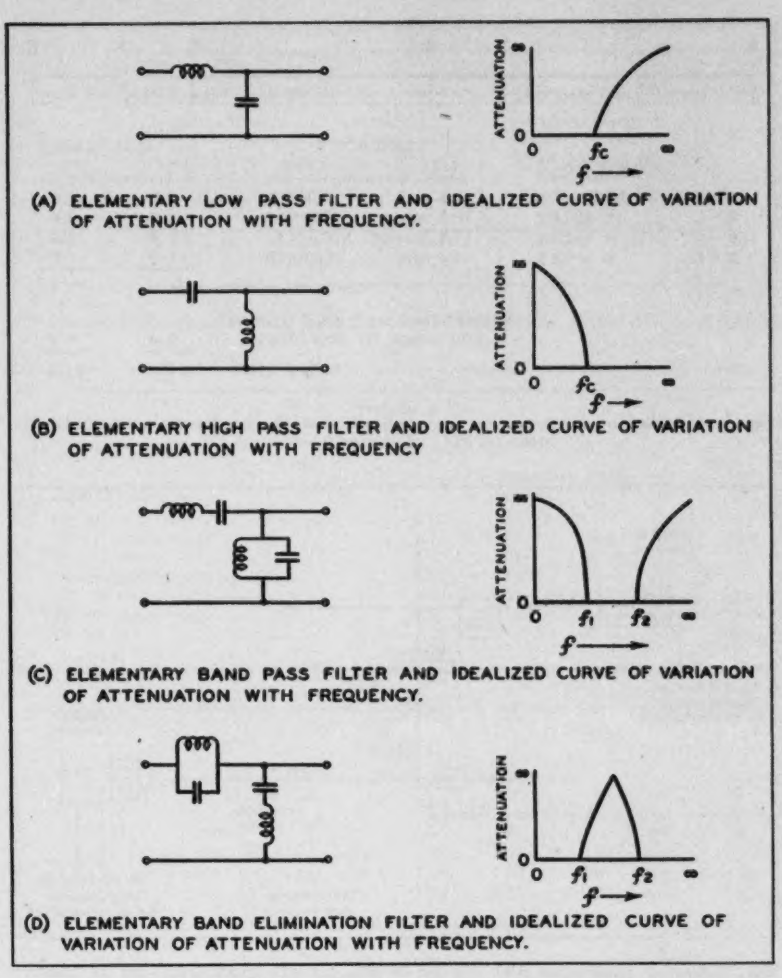


Fig. 1: Curves of variation of attenuation with frequency of elementary filter types

Why and How of

Telephone Line Carriers

R. H. Miller

General Superintendent of Communications
Pacific Gas and Electric Co.
San Francisco

There has been a considerable indicated interest in the application of carrier current telephone and telegraph equipment to utility system telephone lines in the past few years. This interest arises from the economic advantages in obtaining additional communication facilities at low cost, and the possibility of obtaining communication circuits of higher quality than are ordinarily available with physical circuits that may be exposed to induction from adjacent power circuits.

Carrier current techniques have been applied for many years in the communication industry and also with power line carrier applications in the industry. However, it is only in the past few years that economical and reliable carrier equipment has been readily available. Another factor that has made carrier applications more attractive is the development of improved filters for the treatment of telephone lines for the superimposing of carrier signals. Toroidal coils, using powdered metal cores and providing high ratios of reactance to resistance at carrier frequencies, have made possible the design of filters providing better characteristics and smaller physical dimensions than were available with air core inductance coils.

It is the purpose of this discussion briefly to outline the theory of operation of carrier systems and to discuss the treatment of telephone lines to make them satisfactory for operation with superimposed carrier signals. It is hoped that such a discussion will be of advantage to utility engineers who are contemplating the use of carrier equipment, but who have had little or no experience along this line, and also to provide a more general understanding of the problems to be encountered in such cases. Telephone lines, usually found on power systems, present a somewhat different problem than do those of telephone and telegraph companies, because of way stations and power exposures.

What Is Carrier Current?

Carrier current is the term applied to the superimposing of electrical impulses, ordinarily by electronic means, to a communication circuit at frequencies above the voice frequency range, which is usually considered to be from 0-3,000 cycles per second. Carrier transmitters and receivers are devices similar to radio equipment, tuned to preselected frequencies. They are usually coupled to telephone lines through filters so that the carrier current energy is carried on the telephone wires simultaneously with the normal physical telephone signals and without mutual interference.

The carrier equipment can have intelligence applied to it by voice modulation in the case of a telephone channel, or for telegraph applications by interrupting the carrier or shifting its frequency in coded sequence to transmit the desired information. For the purposes of this discussion, the term "telegraph" is used in its broad sense of transmission of any type of coded information by impulses, such as Morse telegraph, teletype, telemetering and supervisory control impulses.

There are various methods of modulating carrier systems such as amplitude modulation, frequency modulation, single-side-band with or without suppressed carrier in the case of telephony and amplitude (interrupted carrier) or frequency shift in the case of telegraph systems. Each of these systems has inherent advantages and

disadvantages. A discussion of these is somewhat beyond the scope of this article and can be pursued further in standard communication engineering textbooks. In general, single-side-band with suppressed carrier has proved to be the most desirable system for carrier telephony or wire telephone lines. This is because of the minimum band width required and the relative freedom from noise of this type of system. With power line carrier applications, the other forms of modulation are more generally used.

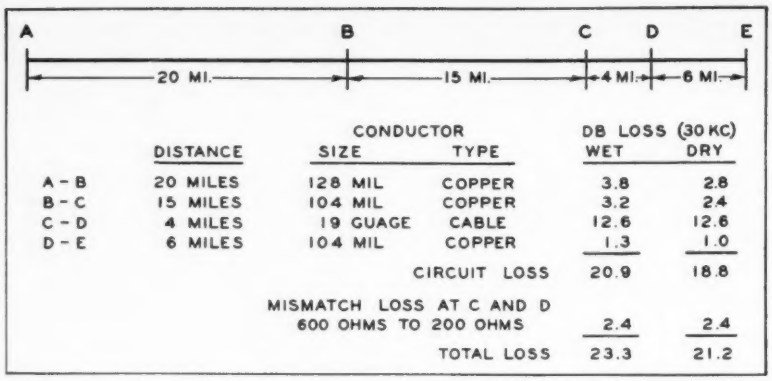
Wave Filters

The foregoing comments have been included to outline in general terms the capabilities of carrier systems and as a background for a discussion of the techniques used in coupling carrier to telephone lines. The principal tools used by a communication engineer in the application of carrier to telephone lines are various forms of electric wave filters. Filters can be made up in various types such as low pass, high pass, band pass, band elimination, etc. Fig. 1 shows the elementary electrical circuits and attenuation characteristics of these four types of filters.

In actual practice the filter structures used are much more complex than shown in Fig. 1, and are usually made up of several sections. Also, because all circuit elements contain some resistance, it is not possible to obtain the ideal sharp cutoff points shown in the characteristic curves. However, they are reasonably well approximated by proper choice of elements. The utility communications engineer is not ordinarily concerned with the actual design of the filters used in carrier systems. He is more concerned with their characteristics of impedance, pass bands, insertion loss and the effects of connecting various filters in parallel or series, and also the voltage stresses to which the filters may be subjected in operation or because of power contacts and induction.

Attenuation

Another factor that must be considered in the application of carrier systems to wire lines is the attenuation or losses that the carrier signals will be subjected to on a given telephone line. Attenuation of a circuit is ordinarily defined as the ratio of power input to a circuit to the output power at the receiving end. It is convenient in dealing with circuit attenuation to adopt the usual communications parlance of decibel notation. The fact that losses on a circuit with



	DISTANCE	CONDUCTOR SIZE	CONDUCTOR TYPE	DB LOSS (30 KC) WET	DB LOSS (30 KC) DRY
A - B	20 MILES	128 MIL	COPPER	3.8	2.8
B - C	15 MILES	104 MIL	COPPER	3.2	2.4
C - D	4 MILES	19 GUAGE	CABLE	12.6	12.6
D - E	6 MILES	104 MIL	COPPER	1.3	1.0
			CIRCUIT LOSS	20.9	18.8
		MISMATCH LOSS AT C AND D 600 OHMS TO 200 OHMS		2.4	2.4
			TOTAL LOSS	23.3	21.2

Fig. 2: Calculation of attenuation for application of the carrier to a telephone line

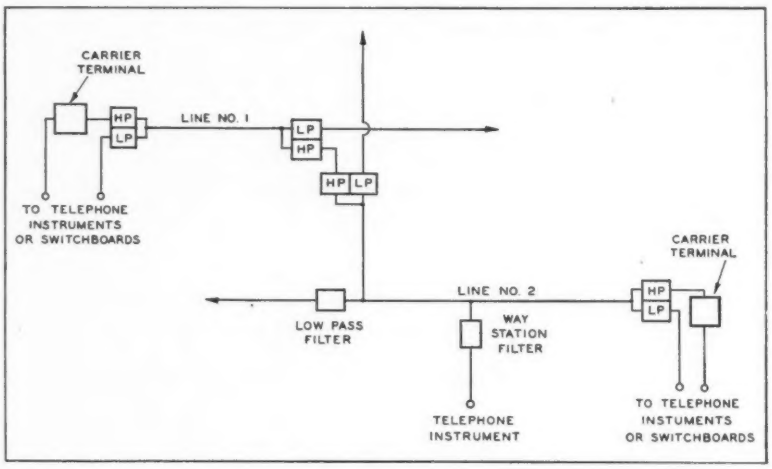


Fig. 3: Carrier application and transfer of the carrier signals from one to another

distributed constants can be expressed logarithmically so that the losses on various parts of a circuit can be combined by simple addition rather than by multiplication is a great advantage. By definition attenuation in decibels (db) is given by the mathematical expression

$$\text{db} = 10 \log_{10} \frac{\text{power input}}{\text{power output}}.$$

Gains or losses in amplifiers and other equipment can also be expressed in db and voltage or current ratios can be used in decibel notation if input and output impedances are equal. In this case:

$$\text{db} = 20 \log_{10} \frac{\text{current input}}{\text{current output}}$$

or

$$\text{db} = 20 \log_{10} \frac{\text{voltage input}}{\text{voltage output}}$$

By referring to a reference level of some predetermined value, the power in a circuit can be expressed directly in db and instruments are frequently calibrated directly in db. In telephone work the reference level is usually taken as one milliwatt (1/1,000 w) with a circuit impedance of 600 ohms. In this case the db level is usually expressed as dbm (0 dbm = 1 milliwatt).

Properties of Wire Lines

Returning now to a consideration of the properties of a wire telephone line, attenuation is affected by the size and type of conductor, the spacing of the conductors and by weather conditions, that is, whether the line is wet or dry and the frequency of operation. Losses on a wet line exceed those on a dry line. In laying out a circuit, the wet or most adverse condition should be used. Table I gives wet and dry losses of various conductors at several different frequencies.

From this table it can be seen that for the application of carrier, copper

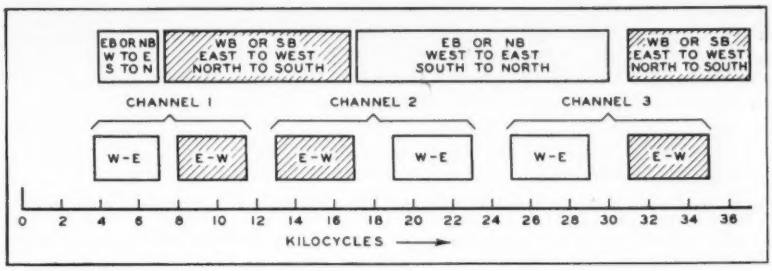


Fig. 4: Channel allocations and directions for three channels of the telephone carrier

Table I

DB Loss Per Loop Mile (12-in. spacing)

Type of Conductor	Frequency (Kilocycles) 1	10	15	20	30
80 mil copper—dry	.11	.14	.15	.16	.19
80 mil copper—wet	.13	.17	.18	.20	.24
104 mil copper—dry	.07	.09	.11	.13	.16
104 mil copper—wet	.08	.12	.15	.17	.21
128 mil copper—dry	.04	.07	.09	.11	.14
128 mil copper—wet	.05	.10	.13	.15	.19
109 mil iron	.28	1.11	1.37	1.62	2.04

Table II

DB Loss Per Loop Mile

Cable	Frequency (Kilocycles) 1	10	15	20	30
16 Gage (non-loaded) .06 uf/loop mile	.73	1.45	1.60	1.71	1.93
19 Gage (non-loaded) .06 uf/loop mile	1.08	2.53	2.70	2.92	3.16
22 Gage (non-loaded) .08 uf/loop mile	1.79	5.03	5.80	6.30	7.20

conductor is much superior to iron and also that with increasing frequency the attenuation increases quite rapidly. Tables and curves giving the loss characteristics of all types of conductors and over greater frequency ranges are available from manufacturers of carrier equipment.

Before giving an example applying the attenuation data of Table I, it might be well to consider a few additional factors that may frequently be encountered in practice. The attenuation properties of telephone circuits, so far outlined, have been for open-wire lines. In many cases it is necessary to transmit carrier signals through one or more sections of cable. The two principal factors to be considered in this case are: (1) The attenuation properties of the cable and (2) the characteristic impedance of the cable as compared to the open-wire section. Considering the attenuation properties first, the losses in a circuit in addition to the resistive losses include dielectric losses. As cables make use of some form of solid dielectric, which has a loss component, the losses on cables exceed those of open-wire circuits. Table II gives the carrier frequency losses of a few sizes of paper-insulated cables.

By a comparison with the data in Table I for open wires, it can be seen that the attenuation on cables is much greater than for open-wire circuits, so that a relatively short section of cable will equal several miles of open wire. These losses can be somewhat reduced by the use of loading coils designed for carrier frequency.

Mismatch Loss

The second factor mentioned above, the characteristic impedance, must also be considered. The characteristic impedance (surge impedance) of a circuit is determined by the size and spacing of the conductors and the type of dielectric used. Most open-wire telephone circuits are designed for approximately 600 ohms and most telephone and carrier equipment is designed on this basis. Telephone cables, however, usually have a characteristic impedance in the order of 200 ohms. To have the maximum transfer of energy in an electrical circuit, it is necessary that the impedance of the load be equal to the impedance of the source. Consequently, if there is a mismatch of impedance in a circuit a mismatch loss will occur and should be considered in circuit layouts. Table III gives the mismatch losses that can be expected for various ratios of impedance.

Table III

Impedance Ratio	Mismatch loss (db)
1	0
2	0.5
3	1.2
4	1.9
5	2.6
6	3.1
7	3.6
8	4.0
9	4.4
10	4.8

By the use of impedance matching transformers between the sections of differing impedance or by carrier frequency loading of the cable portions of a circuit, mismatch losses can be minimized.

Examples

In order to tie together the various attenuation factors that have been discussed, an example will be worked out. Fig. 2 shows a typical telephone line on which carrier signals are to be superimposed and a tabulation of losses that would be encountered. After the attenuation data have been determined, it is possible to proceed with a consideration of other line treatment that would be required and the selection of the carrier equipment that will meet the transmission requirements of the line.

In most existing utility telephone lines there are various taps or way stations. In some cases it may be necessary to transfer the carrier signals from one telephone line to another to complete the desired carrier circuit. Fig. 3 shows a typical case of treatment of telephone lines with filters for restricting the carrier to the desired sections of line and for transferring the carrier channel from one line to another. The low-pass filters indicated prevent the carrier signals from passing onto portions of the telephone lines where they are not desired but permit the voice frequency signals to pass through, relatively unimpeded.

If there is a tap or line section beyond the point where it is desired to terminate the carrier signals, and it is not blocked by such filters, carrier signal energy will be lost. In cer-

tain cases where the line is of such a length as to be an odd multiple of a quarter wave length of the carrier frequency, it would appear as a short circuit to the carrier signal.

The way-station filter indicated in Fig. 3 is normally a form of low-pass filter that serves to isolate the way station from the carrier signals. For way stations where the tap lines are very short, in most cases, a simpler form of filter than would be necessary for complete isolation of a long tap is satisfactory. In the case of lines exposed to power circuits, insulating transformers have been developed that will pass carrier frequency signals up to higher than 30 kc, so that carrier equipment can be protected in a manner similar to other telephone equipment.

Carrier terminals are rated in terms of the db attenuation of the circuit through which they will give a useful signal and are classified as first, second, third channels, etc. Going back to the example of line attenuation calculations given in Fig. 2, under wet conditions a carrier system capable of spanning at least 23 db for 30-kc operation would be required. Various manufacturers' equipment is termed long haul or short haul. Short-haul equipment will ordinarily work through 16 to 24 db, and long-haul equipment from approximately 24 to 45 db. It is necessary in each case to check the circuit losses and determine that the carrier selected is capable of working through the losses that will be encountered. In addition there must be some margin for coupling losses, an allowance made for channel deterioration because of aging of tubes, etc., and to provide an adequate signal-to-noise ratio at the terminals.

As stated previously, it is possible with carrier equipment to obtain several simultaneous channels on one pair of wires. By agreement among members of the American Association of Railroads standard frequency allocations have been set up that have been generally adopted by manufacturers and most users. Conformance to the standard allocation pattern is particularly important when several carrier systems are operated on adjacent lines. Fig. 4 shows a part of the frequency allocation pattern for carrier systems. Similar allocation patterns are worked up providing for 12 and more channels where needed, but utility communication systems rarely require such a large number of channels on one line.

In connection with telegraph applications for telemetering, supervisory control or other impulse types of signaling, carrier equipment is available that can be superimposed onto telephone carrier equipment to provide as many as 12 telemeter channels on one voice channel. In many cases individual telegraph carrier channels are applied to telephone lines between the frequencies allocated for voice communications or above the frequency of the highest voice carrier frequency that it is contemplated to use. The line treatment for telegraph carrier operation is the same as that for carrier telephony as described previously.

It is hoped that the foregoing discussion will serve to provide some basis for a general understanding of the methods of applying carrier to telephone lines, along with a realization of the major factors that must be considered. No discussion has been included on carrier transposing of lines or circuit protection as these factors are a complete subject within themselves. A bibliography on carrier systems and circuit treatment is included for the benefit of those who are interested in pursuing this subject at greater length.

References

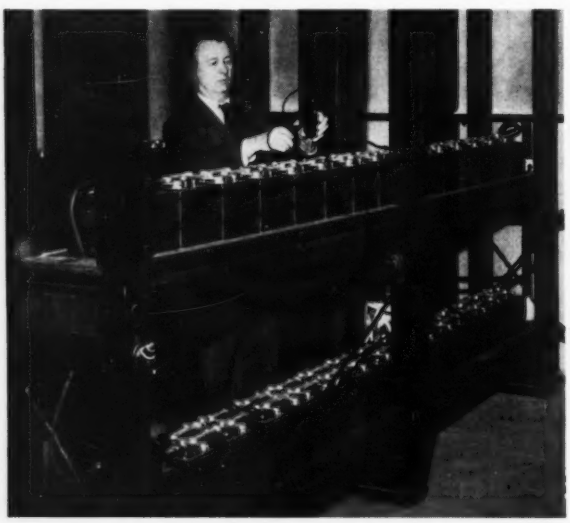
1. *Characteristics of Open Wire Lines and Cables,* Bulletin 57A, Lenkurt Electric Co.

2. *Transmission Measurements of Telephone Circuits,* EM-1501, Kellogg Switchboard and Supply Co.

3. *Electrical Communication,* by A. L. Albert, John Wiley and Sons.

4. *Communication Engineering,* W. L. Everitt, McGraw-Hill Book Co. Inc.

5. *Principles of Electricity Applied to Telephone and Telegraph Work,* American Telephone and Telegraph Co.



Station Batteries Go Automotive

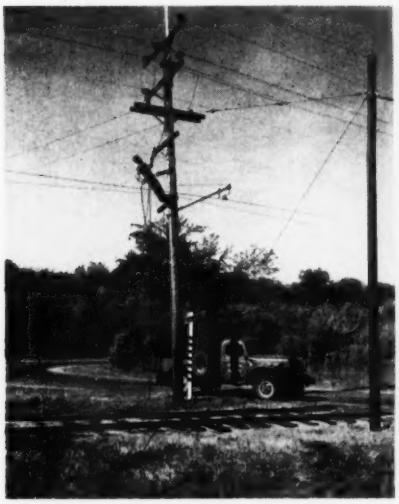
The problem of breakage of glass-jar station batteries has been solved by using batteries of the automotive type, feels George R. Scott, battery shop foreman for the Los Angeles Department of Water & Power. Glass-jar batteries are manufactured in the east and a great deal of trouble and inconvenience has been experienced through breakage in shipment. Although the railroad stands the breakage expense, the department must pay the high freight rate on glass-jar batteries containing sulphuric acid.

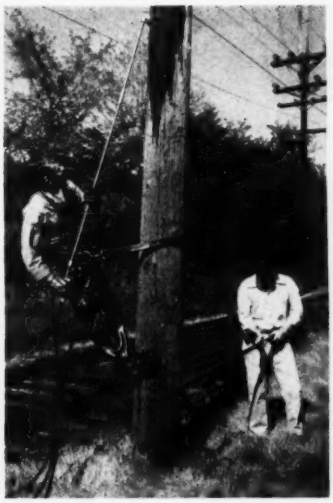
In developing the automotive-type station battery other factors taken into consideration were conservation of space, availability of materials from local suppliers, lower center of gravity making it practically impossible in case of earthquake to tumble the cells from the racks, burned-in molded lead connectors between cells that eliminates high resistance contact loss and a considerable saving in the price of the battery. This battery will deliver a higher voltage on discharge than the glass-jar battery.

Standard 6-v, 80-amp-hour automotive batteries are rebuilt. The center cell is turned around and the three cells paralleled, making a 2-v, 240-amp-hour cell. Holes drilled in the partitions between cells allow free circulation of the electrolyte. A special lead connector matches up with the three positive and the three negative posts. Posts are molded in this connector to allow the intercell connectors between cells to be burned in.

Such batteries can be assembled and charged in 10 days, thus eliminating costly delays experienced previously. It is believed that life expectancy will compare favorably with the glass-jar type.

Although experience is limited, C. M. Allen, engineer in charge of general plant division, states: "We are able to give proof of the many advantages mentioned, particularly the lower time and cost factors in comparison with previous purchases of the glass-jar batteries."





Tops of standing poles are penta treated with plastic tube applicator to prolong life. To insure proper penetration moisture in pole must be below 30%. Test is made with an electric moisture meter as shown.* Trial on one line convinced Portland utility that . . .

It Pays to Treat Tops of Standing Poles

S. J. Pearson Superintendent Outside Divisions Portland General Electric Co.

For several years Portland General Electric Co. has engaged in prolonging the life of standing poles by the osmoplastic ground-line treatment. However, it was found that ground-line treatment of certain old poles was not warranted because the condition of the pole tops would necessitate replacement before the full benefit of ground-line treatment was realized.

This situation led to an investigation of various means whereby the life of pole tops could be prolonged. The most promising method appeared to be treatment with a 5% pentachlorophenol solution. This treatment had been applied experimentally for several years by a contractor in the east, Pole Sprayers Inc. of Buffalo, N. Y. In order to examine the method, the writer made a visit to one job site in Jackson, Mich., where the contractor was applying the treatment for Consumers Power Co.

Direct observation of the method disclosed that full sapwood penetration was being achieved, as well as a retention of .25 lb of penta crystals per cubic foot of sapwood. This is the same specification used in full length treatment of new cedar poles by many of the commercial treating companies. Indications were that an additional life of from 15 to 25 years could be given to old cedar poles by the treatment. The only disadvantageous feature of the treatment was that it could be applied only when the moisture content of the wood was below 30%. This would limit the feasibility of application in PGE territory to the months of approximately June through September.

In considering pole leads on the Portland utility's system where this treatment might be used to greatest advantage, it was decided to try it out on a 57-kv line from west Salem to south Dayton. These poles are 27 years old and were the first incised butt, creosoted Western red cedar poles on the system. Half of this lead had been osmoplastic treated at the ground line, but the condition of the tops in the other half was so serious that replacement within three or four years was contemplated. Less than 10% of the butts were in a condition to warrant replacement so that 90% of the poles could be saved by above-ground treatment.

Cost of replacing the entire lead would be about $60,000 and new capital would be required for about half of this amount because of the increase in replacement costs since the line was built. At an annual charge of 12% on the new investment, approximately $3,600 per year of extra life could be obtained by the treatment. At this rate the treatment would pay for itself in two years.

An agreement was made with Pole Sprayers Inc. to do the work and its crew commenced in August of last year. The poles are first tested with an electric moisture meter to determine moisture content. Linemen then climb the poles and spray as they descend, treating the crossarms as well as the poles. A record is kept of the quantity of solution applied to each pole and borings are made at regular intervals to test depth of penetration. These borings are analyzed also for penta content as part of the service.

The company believes that this system of conserving pole timber will enable it to avoid to a certain degree the increasing cost of pole replacements on permanent leads. Pending the outcome of this initial test, records are being studied to determine other places in the system where pole-top treatment may provide savings.

*Photographs were borrowed from Pole Sprayers Inc., since none were available to illustrate the Portland application. Pictures were taken by the Toledo Edison Co.

Washington end of McNary Dam showing navigation locks and spillway. Power house on Oregon side to right is nearing completion

McNary Turbines Set Record for Size

Harry A. Doell Sales Engineer, Western Territory
S. Morgan Smith Co.

McNary Dam, one of the large power developments on the Columbia River, is rapidly nearing completion. The dam will be 7,365 ft in length including its earth abutments and 158 ft in height above bedrock through its concrete section.

The power house section, located on the Oregon side of the Columbia River, is presently designed for the installation of 14 hydroelectric generating units of 70,000 kw capacity each. The generators will be driven by adjustable-blade, Smith-Kaplan propeller-type turbines, each having a rating of 111,300 hp when operating at a normal speed of 85.7 rpm and under an effective head of 80 ft. These turbines are the most powerful adjustable blade-type turbines under construction or in operation in the world.

Hydraulic Turbines

Although the turbines are relatively a small percentage of the total cost of the project, their performance is of first importance as McNary Dam is primarily a power development. These turbines, now under construction at the York, Pa., shops of the S. Morgan Smith Co., are similar in physical size to the 10 Smith-Kaplan units installed at the Bonneville power plant. However, because they will operate under a much higher head than at Bonneville, they will be more powerful and of a different design.

The turbines are designed for a wide range in head conditions because of the variation in flow of the Columbia River. This variation will result in wide changes in turbine tailwater levels. The effective head will vary from a minimum of 65 ft to a maximum of 92 ft. When operating at the minimum effective head of 65 ft, the turbines are guaranteed to develop at least 93,000 hp. When the tailwater level is low, because of low river flow, the effective head will increase up to the maximum of 92 ft. At this maximum head condition the turbines will be capable of developing more power than the output capability of the generators. Under this high head condition it will be necessary to limit the turbine output.

Generators

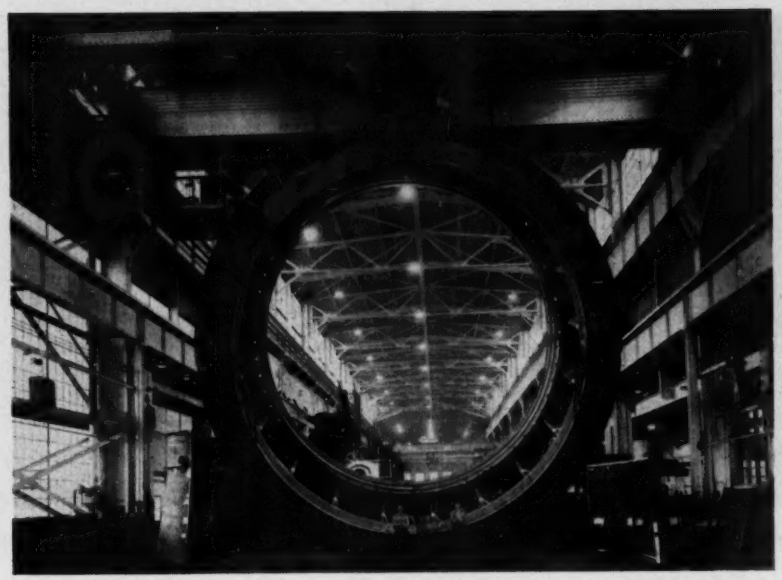
The McNary generators, being manufactured by the General Electric Co., are rated at 73,684 kva at 0.95 pf and 13,800 v, with a temperature rise not exceeding 60 C. The 32% guaranteed transient reactance required by the U. S. Army Engineers makes these generators equivalent in physical size to 90,000-kva machines of base characteristics. With a net weight of approximately 2,400,000 lb, these units are believed to be the heaviest hydrogenerators built.

The mechanical arrangement of the generators is conventional, including the thrust bearing located above the rotor and two guide bearings. A feature of these generators is the thrust bearings designed to carry 4,000,000 lb, an increase of a million pounds over the previous record of 3,000,000 lb for the units at Bonneville.

Pertinent Data

To aid in visualizing the size of these turbine units, it is felt that the following facts, figures and accompanying photographs will be of interest.

Inlet water passage to each turbine is approximately 86 ft high at the entrance on the reservoir face of the dam and is 74 ft wide near the turbine stay ring.



This immense fabricated stay ring is for one of the 111,300-hp McNary Kaplan turbines

Each turbine will discharge at rated capacity almost 14,000 cfs, which is comparable to the average flow over the American Falls at Niagara.

Diameter of the turbine runners is 23 ft 4 in., and they weigh approximately 423,000 lb each without shafts. Each turbine rotating element weighs approximately 740,000 lb and will develop a flywheel effect of about 8,500,000 (WR^2) lb per sq ft. Stay rings weigh approximately 175,000 lb each and are 36 ft 6 in. diameter.

The heaviest section (runner, shaft, intermediate top plate, bearing, etc.) to be handled by the power house crane weighs approximately 690,000 lb or 345 tons.

Maximum hydraulic thrust developed by the turbine at normal speed and normal head is 1,950,000 lb.

The turbine shafts are 44 in. in diameter at the smallest section and the servomotor piston for operating the turbine blades, which is located within one section of the shaft, will be 80 in. in diameter. This servomotor will develop a force of 1,735,000 lb when operating on the rated oil pressure of 350 psi.

Efficiency

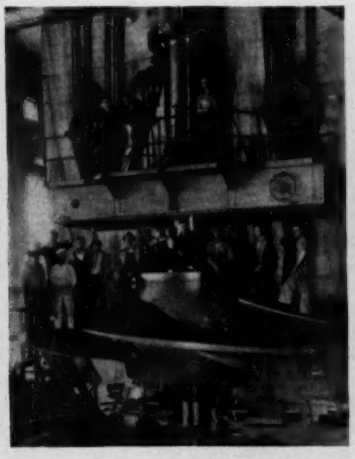
Guaranteed efficiency of the turbines when operating with an output of 111,300 hp at 80 ft effective net head is 86%. However, the expected performance curves indicate an efficiency of 91.8% or better from approximately 49,000 hp to 111,300 hp and a maximum efficiency of 93.8%.

Before starting the manufacture of these important turbines, the hydraulic design was thoroughly investigated in the laboratory. Two models were built and tested, one having a runner diameter of about 16 in. and the other of 12 in. Each model was complete with semispiral case, draft tube, wicket gates and runner, all homologous in shape to the designs for the large units.

Extensive tests were made in the laboratory on both models to determine the power efficiency, cavitation characteristics and run-way speeds of the turbine. The model turbines were equipped with adjustable blade runners and servomotors for controlling the blade angles in the same manner as the large unit. This permitted measurements in the laboratory of the hydraulic forces that tend to change the blade angle and must be overbalanced by the blade servomotor.

Some variations in design were tried out on the laboratory models and the best features were then incorporated in the design of the large units. This procedure assures that when the large units go into operation at McNary they will have a high efficiency, will be able to operate at the design or beyond without occurrence of objectionable cavitation, and in other respects satisfy operating conditions.

The McNary power and navigation project is progressing in accordance with prearranged schedules. The first turbine-generator unit is scheduled for operation in December 1953, with the last of the 14 units to go into operation in the early months of 1957. When completed, this great block of power at McNary will not only aid the progressive Northwest and national defense but will increase the nation's wealth and productivity.



Assembly view (left) of embedded parts (stay ring, pit liner and discharge ring) for unit No. 4. Center: Six-blade McNary runners are similar in size to this five-blade Bonneville unit. Right: Each McNary draft tube will carry water of Niagara's American Falls

Tecolote tunnel, where an underground river of hot water, corrosive gases and humidity played hob with the electrical equipment

Expect the Impossible from an Electrician?

Jack Whitson Chief Electrician, Halvorson Contractors

What would you do if you had used every insulation known and still burned out 27 armatures in two months; if all fuse terminals corroded in a week; if all switches ceased to function; if the corrosive conditions were so bad that when a man came out of the tunnel after his shift the coins in his pocket had turned black?

Do they expect the impossible from a chief electrician? Well it certainly seemed so on the Cachuma Water Project in the Santa Ynez Valley of California, where Halvorson Contractors were pushing an eight-foot hole through the coast range from Chalk Rock in the Cachuma reservoir, 6.4 miles to Glen Canyon in the Goleta area, 15 miles above Santa Barbara.

When completed, the Tecolote tunnel will have the capacity to carry all the water needed in the foreseeable future by the water districts of Goleta, the city of Santa Barbara, Montecito, Summerland and Carpenteria. It will feed into the South Coast conduit system for distribution of the available water supply accumulated in the big reservoir on the other side of the mountains.

Halvorson started boring through from the north side on March 3, 1950. A few weeks later they started in the south or outlet side. Rapid progress was made for many months. From the background of our experience this was a standard routine job.

Then on Aug. 8, 1951, when we were 11,500 ft in from the outlet side, water started flooding the tunnel. An estimated 2,000 gal a minute burst through into one section. There were fireworks in the heading as all my pumps, transformers and lighting installations became submerged. We had hit an underground river running out of a three-ft hole at 350 psi and at 87 F temperature.

It took us two months to get the flow under control and into auxiliary pipes so it could run off through the tunnel and into the completed South Coast conduit system. That water has been coming out of there for the past year at the rate of 6,000,000 gal every 24 hours.

Operating conditions in the tunnel became the toughest to which any electrical equipment has ever been continuously subjected: 100% humidity, 110 F temperature, sulphur dioxide, hydrogen sulphide and methane gases all contributed to continual equipment failure.

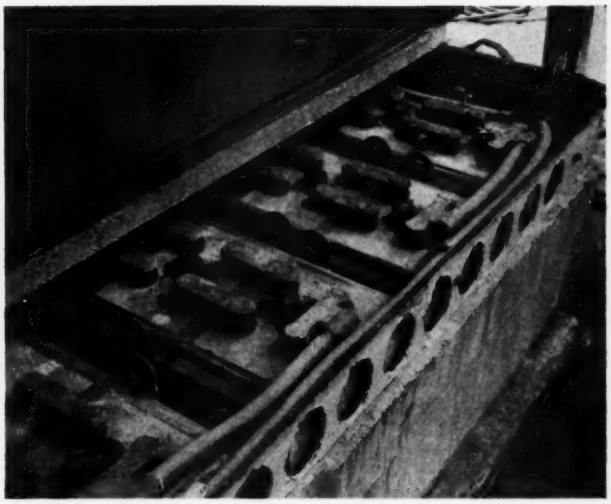
More than 130 transformers varying from 3 to 37½ kva are installed throughout the tunnel. We maintain 3 kw of lighting every 1,000 ft and concentrated in 500 ft of the heading we furnish 15 kw of lighting. In the entire installation are over 100 magnetic switches, over 50 disconnect switches, and fuses varying from 60 amp 250 v up to 100 amp 2,300 v capacity. On top of this we had to install additional pumps until now we have 67 of them varying from ¼ to 50 hp working around the clock to keep the tunnel clear so that operations can continue.

Even though we used every special insulation product then known, we had 27 armatures burn out in two months. The fuse terminals corroded through in one week. Switches ceased to function. When a man came out of the tunnel after his shift, the coins in his pocket had turned black.

Finally, the manufacturers of the electrical units we needed gave up and balked at giving us any kind of a guarantee. It looked as though we would have to set up our own motor rewind shop to keep up with the failures we were experiencing.

When we had given up all hope of effectively combating our problem, an engineer from the Safe-T-Seal Laboratories in Los Angeles came up to inspect the job. He suggested that we Safe-T-Seal one of our motors after it had been rewound and see how it would stand up. That visit was the beginning of the solution to all of our electrical maintenance problems.

Motor stators corroded like this in a month before treating



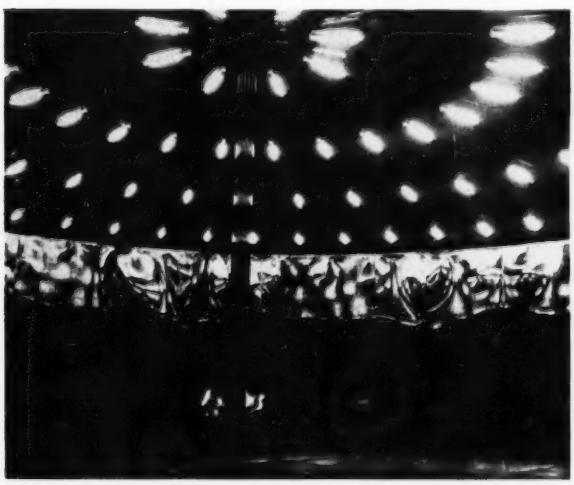
Now even storage batteries keep clean of corrosion like this

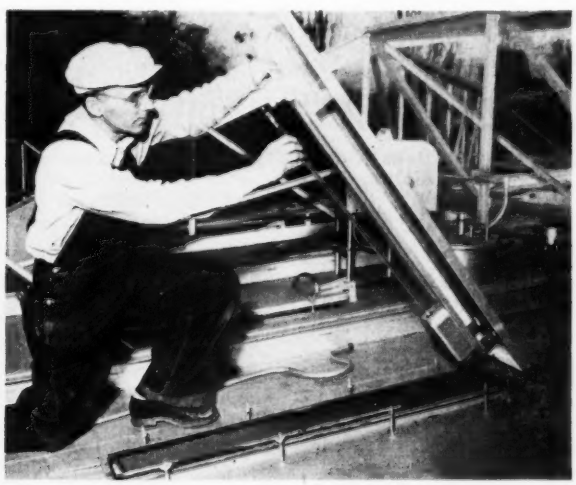
Today, 15 months later, all of our equipment is giving reliable service at a minimum of cost. Safe-T-Seal was applied by R. A. Reed Electric Co. of Los Angeles over the regular insulation on all of our rewind jobs. Each new piece of equipment we order is shipped directly to Reed's shop for Safe-T-Sealing before delivery to us. Fuses, transformers, dry cell batteries, switches, flashlights, telephones and any other piece that is exposed to or carries an electrical current we Safe-T-Seal ourselves. We even use the product on the Bakelite cases of push-button switches to keep them from swelling.

With the electrical equipment functioning satisfactorily after this processing we then proceeded to concrete off the flow of water from the underground river. So far, this part of the job has not been completed.

In the meantime, the Cachuma reservoir is starting to fill up. There is still considerable footage of the Tecolote tunnel to be pushed through. We have closed off the intake end with a control gate and are driving a shaft down to the tunnel from above high-water level. Operating through this shaft is going to complicate getting in and out.

Fortunately, the coastal area at Santa Barbara can get its water from inside the tunnel without using any of the Cachuma reservoir supply. Eventually, we will finish the project, but not on schedule. That's for sure.

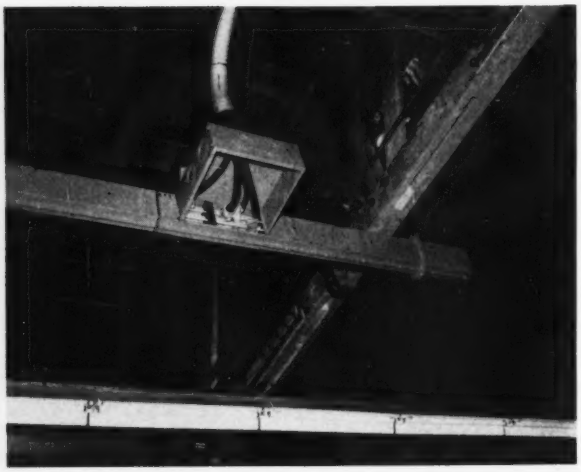




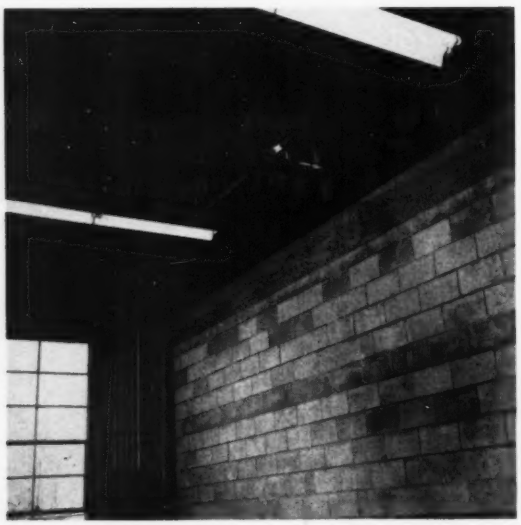
Keeping Sugar Sweet with U-V

To keep liquid sugar from spoiling or fermenting in two 1,000,000-gal storage tanks, California-Hawaiian Sugar Refining Co., Crockett, Calif., installed four concentric banks of Westinghouse Sterilamps, 112 lamps, in each 95-ft diameter tank dome. Surface sterilization is all that is needed to inhibit air-borne organisms. The 30-w lamps are mounted in special fixtures built by the C&H electricians, wired to eight circuits. The fixtures are so designed as to make for easy replacement, as shown in the picture on the right. They are accessible from the top of the tank roof or dome. U-V light meter tests are made periodically to determine when lamp replacements are necessary.

Aluminum bus-duct sections were fastened to chords of trusses



Feeder connections were brought up in conduit to enclosures



Taps to bus duct ran down to panels and back to fixture rows

Pringle switch made for a compact main switchboard installation

Aluminum Bus Duct Speeds Installation

Aluminum bus distribution found its first extensive application in the new electronic laboratory and production plant of Sylvania Electric Products Inc. in Mountain View, Calif., dedicated a month ago. With it Schwartz & Lindheim, electrical contracting engineers of Oakland, were able to reduce the ceiling truss load by 30%, as well as speed installation. Over 600 ft of this BullDog plug-in duct hangs from the 100-ft span in three straight rows. Contact surfaces, to overcome corrosion and electrolitic problems, are silver plated over the zinc coated aluminum bus bar. As was the bus duct the eight continuous rows, 350 ft long, of Sylvania industrial two-lamp fixtures, 756 in all, were assembled on the floor and raised by mechanized equipment for fast installation. Close scheduling of materials and labor also made for shortened installation time. The 756 fixtures were hung in a five-day span and the bus duct, excluding feeders, in three days, at no time with more than eight men. The main switchboard, designed by the engineer-contractors and built by Parker Electric, contains a 2,000-amp Pringle switch instead of a main breaker, at a saving of both cost and space. A louvered trim permits air circulation. The board is fed through the wall from an outdoor substation, from 12 kv to 120/208 3-phase 4-wire. The whole job, including office and conference room with Sylvania luminous ceiling, was completed in 90 days. Use of tools—wire strippers, electric hammer drills and screwdrivers, special pipe wrenches, etc.—plus scheduling did the trick.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Word stretcher

A speech shrinker was offered as the newest boon to suffering banquet and convention victims. Only trouble is that it also stretches them when operating in reverse. This newest wonder of electronics was shown at the Institute of Radio Engineers convention in New York as a means to fit a politician's talk into a radio time limit, either by shrinking or speeding it up or by stretching it out. Claims not to distort the pitch or tone as you'd expect. Make it any funnier?

Steady work

Construction seems to be holding a good pace most everywhere in the West. It is not the big boom of wartime, and it may be in certain kinds of construction, but it is substantial. New house starts are surprisingly large in view of costs but population moving West continues to put pressure under housing. Amusement and commercial building now freed of controls seems to be most active; industrial has slowed somewhat. The new administration's orders to review all military projects to see if really needed has dampened that big bonanza. Sweet talk from Russia may further level off defense construction.

One more heave

Unions are putting desperate pressure to get one more big wage raise and all the fringes they can wrangle before the peak. However, the peak may have been passed without recognizing it. There is more resistance building up among contractors who know they will have a hard time selling high-priced labor to anyone beside the government.

Yes, it's true

Travel and sustenance allowances are wages as far as Federal Insurance Contributions Act and Federal Unemployment Tax Act are concerned. Not willing to believe that ruling, made last month to the Sacramento Valley Chapter of NECA, the San Francisco Chapter appealed for clarification from up higher and got the same answer. Travel expense and sustenance expense in a union contract can be segregated from wages and need not have taxes withheld for income tax, but must be taxed as wages for old age and unemployment—thus complicating bookkeeping still more.

Your alibi

Controls were completely removed from prices last month, the only remnant being that records should be kept for two years in case some investigator comes in to check on any transaction made during the controls.

Free the materials

Materials too are decontrolled or will be almost completely. Instead of CMP the only thing left will be a priority order on materials for the Atomic Energy Commission or other very vital project—a sort of a hold on such materials as needed, without any attempt to control what's left.

Contractor design

A portable, hand operated knockout punch, making use of the hydraulic principle but so constructed as to make use of the standard knockout dies (such as Greenlee), has been developed by H. K. Caldwell, electrical contractor of San Diego and is ready to be marketed. It works especially well on larger sizes, but has a range of from half-inch pipe up to 4-in. in metal up to 10 gage. Unit only weighs six pounds. Caldwell says that in his 27 years of contracting this is the biggest time saver for conduit installations.

Killed on bounce

A helper was killed, in Phoenix, last month, when a stud fired by a powder-actuated gun struck something in a concrete wall into which it was being driven, turned back and through an outlet box into the heart of the helper, who was holding the conduit and box while the wireman was attempting to fasten a pipe strap to the concrete wall with the gun.

Contractors' forums

Two regional or district meetings of National Electrical Contractors Assn. are being prepared for the first two weekends in May. At Vancouver, B. C., the Puget Sound Chapter is making ready for the District 6 meeting, May 7-9. In Billings, the Montana Chapter is preparing for a District 8 conference there at Northern Hotel, May 14-16.

Wage ferment

Lots of wage and fringe stew is aboiling as time approaches for contract renewals or amendments. The bellweather, San Francisco Electrical Contractors Assn., was willing to offer Local 6 IBEW the same as Oakland but membership wanted more, so the latest demand is for 30c an hour increase, to include a vacation and health and welfare. Also asked the employers to pay a $2-a-week tool allowance for each man. Other locals are asking for tool insurance for the men, something that would cost as much as buying new tools and would encourage "lost" tools. Travel time and expense and sustenance are hot issues in many areas.

Merger trouble

In Salt Lake City the NECA and union took their wage issue to the Council on Industrial Relations for the Contracting Industry, which awarded a 10c increase to make the Journeyman scale $2.70. Health and welfare was denied. In the Pocatello and Idaho Falls area, which were amalgamated into one union jurisdiction the scale was settled at $2.65 and $2.55 at Idaho Falls. When Twin Falls was also brought into the same it resulted in a lapse when there was no agreement and caused a work stoppage. This is given as the reason the meeting of the Idaho State Electrical Contractors Assn., which was scheduled for Twin Falls last month, was postponed at the last minute.

Three in one

Big "progress meeting" of IBEW, Arizona Public Service Co. and NECA chapter in Phoenix was held April 22-25, attended by J. Scott Milne, IBEW national secretary and Lloyd Ingraham, District 5 IBEW vice-president. Both line and inside locals participated and had separate, then joint meetings.

Back to a house

Arizona Chapter, NECA, has moved, as the Los Angeles Chapter did some years ago, to an old residence, located at 1036 W. Washington St., Phoenix, where the various rooms are being converted into offices and conference rooms. Jerome M. Kelleher, manager, also conducts his other labor relations business from this office. Formerly chapter headquarters was in the Luhr Bldg. The chapter conducted the NECA accounting course for members recently and is busy with negotiations in several parts of the state.

Rolls own program

Santa Clara & San Benito Counties Electrical Contractors Assn., an independent association, is going to have a business promotion program too. First action along that line was participation with an exhibit in the Homes Beautiful exposition in San Jose in April. Another activity of the group, according to George Harter, manager, is a cost forum, one night a week for four weeks in April, to take up estimating methods and procedures. The group is also working on a uniform code for the territory covered in the association.

Traffic sifter

Nevada Electric Co. in Las Vegas is installing new automatic traffic signals at two tricky intersections, one at south Main and south Fifth, the other at north Main and north Fifth. The former, a Y intersection requires 14 lamp signals and a complex system of treadle and detector actuators for complete cycle of automatic operation. Equipment is from Automatic Signal Division of Eastern Industries. These are the first such systems in Nevada. The same firm is wiring 250 homes in rhe Ivanhoe tract, completely electric, including range, water heater and heat, with load regulators.

New lineup

Melvin G. Lewis, electrical engineer, has left Bechtel Corp. to associate with A. L. Buonaccorsi and Joseph E. Murray under a firm name of Buonaccorsi, Murray & Lewis at 350 Mission St., for consulting mechanical and electrical engineering. He takes over the interest of George Garthorne who is retiring.

Promoted

Jack Amann has been appointed branch manager of Square D's San Francisco office, where he has been branch manager the past three years. He succeeds Ray Anson who recently became a manufacturer's representative. Amann joined Square D in 1935, is a Cal-Tech graduate, comes from Spokane.

Moves South

Ben B. Lezin, Seattle consulting electrical engineer for the past 18 years, has moved to San Francisco and set up an office in the Phelan Bldg. He has handled the electrical design for several major hospitals and commercial construction in the Northwest. He is a member of AME, IES.

Moves

F. M. Nichols Co., manufacturers' representative, has moved from 140 Spear St. to larger quarters at 714 Harrison St., San Francisco.

Musical chairs

Westinghouse Supply is continuing its nationwide change of organizational setup. It hit the San Francisco Bay region last month and brought these changes: Moved E. E. Morton, who was district manager at Omaha, to San Francisco as manager of apparatus & supply for northern California district and made Robert S. Sloan its consumer products manager instead of district sales manager of appliances. Charles Mathews, who was district manager of Wesco in San Francisco, moved to Oakland as manager of apparatus & supplies; W. Karl Ostler, formerly Oakland branch manager, became district apparatus & supplies sales manager. Arthur B. Darby, who had been southern California district manager of specialties sales, came to Oakland as branch manager of consumer products. He had formerly been in Salt Lake City and Boise. And Frank E. Young, former district apparatus & supplies manager in San Francisco, was transferred to southern California district as branch manager of apparatus & supplies in Salt Lake City.

Parent too

Similar reorganization is going on in the Westinghouse Electric Corp. Walter Maythem, manager Pacific Coast District, just announced the creation of a San Francisco branch office with Harold Rethmeyer as manager. The latter appointed four sales supervisors. Agency and construction department supervisor is G. Burnett Mason.

First up turn

Lamp prices, both incandescent and fluorescent, went up in all companies this month. Increased costs of labor and materials pushed the price up, each company said, noting that it is the first boost in some years. Fluorescent lamp prices went down in 1951, to bounce back up and now comes another increase.

Orchids

Fine thing was done for Ted McDougall, Seattle victim of two accidents that cost both legs. Electrical Contractors of Washington Inc. and electrical wholesalers furnished materials and installed the wiring in a home built for him by Kiwanis and Lions clubs, neighbors and friends. Participating were Neilson Electric Service, Drewien Electric, Brighton Sales & Service, Warburton Electric, Bronson Electric; materials from Graybar, Globe, Peerless, Northwest, Gilbert Bros., NuTone, Seattle Lighting Fixture, G-E Supply, Westinghouse Supply, Bean Electric and Palmer Electric. T. Ralph Neilson and Harold Raatz were especially active.

Takes over

Harbert Electric Co. of Boise has been bought by J. T. Jacobson, general manager of the company for Mrs. Sue Harbert, widow of W. H. Harbert.

Promoted

Dan Coyle has been made general manager and chief engineer of E. A. Johnson & Associates Inc., consulting engineers, Sacramento. He joined the company as chief electrical engineer about a year ago after serving as project engineer for the government in Guam.

Retires

Jim H. Brundage has taken over the territory covered by Sam Russell of H. B. Squires Co. as Day-Brite representative for northern California. Russell is retained on a consulting basis. Brundage makes headquarters at 288 7th St., San Francisco.

Honor

Glen E. Arbogast, veteran electrical contractor, chairman of the board of Newbery Electric Corp., Los Angeles, was named construction man-of-the-year at the annual dinner of the Los Angeles Chamber of Commerce building industries committee.

Huge growth

Sylvania Electric Products had 60 staff members from Seattle, Salt Lake City, Los Angeles, Oakland and San Francisco at a 3-day conference in San Francisco's Mark Hopkins, March 16. Garlan Morse, Pacific Coast director of sales, had H. Ward Zimmer, executive vice-president, tell Sylvania's growth and plans for the future; Bart Wickstrum, who set up Sylvania's first office in the West, now sales vice-president, stress management; Paul Roberts, management consultant to talk of a new Sylvania sales management program. George Connor, general manager of the photoflash department, told of opportunities in this field. An inspection of the new electronics laboratory just finished at Mountain View was included.

Men move

Wm. L. Friend, for six years in Los Angeles, has been moved by Sylvania to become San Francisco division manager, at Emeryville, and Robert L. Harper to Los Angeles as division manager there. Charles I. Brady, former Los Angeles manager, was transferred to Wheeling, W. V., as sales manager of fixtures. Sylvania now has the State of California lamp contract, served through S. F. Lighting and Blake, Moffatt & Towne.

More on wire

Remember the wire forums? Well NEMA now has begun distribution of complete texts of the talks and the discussion to all who attended or to all wishing copies. Latest development is that the California Division of Industrial Safety and a number of major industries will collaborate on a series of tests and surveys of wiring systems to obtain factual data from field experience as a basis for any future changes in either the Safety Orders or to suggest to the National Electrical Code.

Struck out again

Washington state's proposed electrical permit fee bill, S.B. 155 was again washed out for lack of time when the legislature adjourned before considering it. It cleared the public utilities committee with a "do pass" but got bogged down in the rules committee, according to Tom Widrig, chairman of the legislative committee of the Washington State Electrical Council, the sponsoring group. At present the inspection support comes only from licenses paid by contractors and journeymen, none from permit fees, and is insufficient to employ enough inspectors.

Right hotel

Oops, excuse please! In announcing the Silver Jubilee joint meeting of all International Assn. of Electrical Inspectors sections, at Chicago, Sept. 21-26, we named the wrong hotel. It is to be at the Edgewater Beach. Reservations cards are out now to members and all are urged to make them early. Special features will be a big electrical equipment display and a visit to Underwriters' Laboratories Inc. main lab.

Uniformity sought

Review and Revision of the Los Angeles city electrical code is underway following action initiated last year by the Building and Safety Commission of the city. At a public hearing in December NECA recommended a committee representing all interested parties be appointed to work with the commission. Such a committee was formed in February and it has started studying the existing city code, the state Safety Orders and the National Electrical Code with a view to developing a code as nearly uniform as practical for the area. What would be even more desirable, says Julien H. Davis, chairman of the code committee of the Los Angeles Chapter, NECA, would be one uniform code for the whole state or at least the southern California area. NECA asks other communities interested or that have had experience with use of the National Electrical Code alone to communicate with it and pool all this knowledge.

Pass on saving

A 30% price reduction was announced for its all-luminous plastic, suspended ceiling, at the end of its national sales meeting attended by Western representatives, by F. W. Wakefield Brass Co. of Vermilion, Ohio. A. F. Wakefield said the reduction comes not from lower materials costs or cheaper materials but from several manufacturing improvements, principally a new method of fabricating corrugated Plexiglas sheets.

Long heat

Long Tube radiant heaters called Merco are being manufactured by Corona Mfg. Corp. of 5210 San Fernando Rd., Glendale. The long tubes are said to give a much more even and better distribution of heat especially where products move along the heating elements such as on table conveyors. They are made up in troughs or oven sections.

Monopoly or not

Taft-Hartley Act changes are slow in coming. Business Week's opinion is that labor leaders are even getting fearful that, instead of being weakened in their favor, it may get even tougher and they may decide to let it ride as it is. Certainly the closed shop and union shop issue is made the crucial one in the Southern California Edison strike by IBEW. Since the U.S. Supreme Court upheld a Virginia "right to work law," similar bills are being put up in several state legislatures. Assemblyman Harold Levering of Los Angeles put in such a bill in California, referring to the Edison strike as proof of its need. Also significant was a California Supreme Court decision upholding the ban on jurisdictional strikes.

All purpose

Square D has a new packaged gutter or duct with hinged covers and catches to hold the cover in closed position, called Lay-in Duct, for feeders, branch circuits or groups of conductors. The connector is a square unit with a friction hinge which telescopes for adjusting to distances from 2 to 12 in. There are adapter fittings for connections to panel and switchboards.

To tell and sell

NISA—National Industrial Service Assn., that is, now has an information pamphlet for its members to distribute to tell what NISA is, what it does, who belongs and how it serves the industry. NISA convention is to be at Hotel Statler, New York City, May 24-28.

Can Direct Mail Help Contractors Sell?

It uncovers new customers for lighting maintenance as well as other business, experience with Sylvania's plan shows

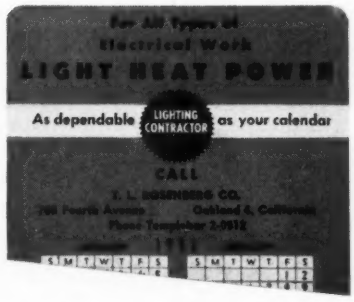
If the answers from electrical contractors who took advantage of the program are proof, then the direct mail Qualified Lighting contractor business building program offered them free by Sylvania Electric Products Inc., and about to be repeated, was something that made more business and customers for contractors in the West. To check over the results of last year's program a number of them were queried. Answers show that it worked where the contractors themselves worked with it.

"As far as I am concerned, it is a most successful direct mail program," said Bert Osterman, manager of the fluorescent maintenance department of T. L. Rosenberg Co. "Normally, you expect one or two per cent return on the expenditure, in our case only $39 for postage. Our return is running about 500%. Business directly resulting has been averaging from $200 to $300 a month."

T. L. Rosenberg himself, with a long service as officer of the local and national association, National Electrical Contractors Assn., has long urged his colleagues in the business to do more aggressive selling to dramatize a contractor's ability to provide goods and services many people need. He was one of the first to establish a lighting maintenance department.

"Perhaps one of the most difficult phases of the industry to sell is fluorescent maintenance," Osterman points out. "We have pioneered it for seven years, starting with the part-time use of a truck and one man. Today it takes four trucks to service our several hundred accounts. If any one factor is responsible it is *selling*. It takes work. Hard work. It takes persistent calling and follow-ups. This Sylvania plan helped tremendously by opening the door and inviting inquiries. That's all we needed. We plan very definitely to continue using it."

In San Francisco William Abrams of Eveready Electric Co. says, "The key to any successful direct mail program is the mailing list. We spend hours determining which persons at any given plant should be addressed and frequently we have as many as five or six in one firm on the list." He reports receiving 60 responses and four new accounts to the program.



Typical literature with contractor's imprint

The program has been used differently in various sections of the West. With the Columbia-Oregon Chapter of NECA the organization as a group backed the program. It furnished letterheads and postage sufficient to contact some 450 architects, engineers, as well as over 3,000 commercial and industrial firms. On the reverse side of the letter is a complete list of the members. Inquiries are directed to the NECA chapter office and given out in rotation and by area, enabling every contractor to act on the most promising prospects.

One contractor in the Los Angeles area was reported by Roger J. Delander to have secured business amounting to over $7,000 as a direct result of interest created from the mailing. In northern California over 80 contractors participated, and 70,000 pieces of mail went out. In Sacramento, Wismer & Becker reported more inquiries than they had been supplied with booklets and ordered more.

A few more of typical reports: Malm and Welter, San Francisco, had 50 returns from the first 500 mailing including two customers they had lost but who returned. Jim Hawks of Bergeson Electric, San Bruno; Harold Hammond of Richmond Electric, Burlingame; Bill Biber of Biber Electric, San Carlos; E. Marshall of Marshall Electric, San Carlos, all reported a handsome response. "We are astonished at the 34 cards we got back," Emil J. Weber, San Francisco, said. S. N. Feldman Engineering, Berkeley, got 26 cards.

Briefly the program was outlined by Garlan Morse, Pacific Coast director of sales for Sylvania, to consist of three parts. Campaign A has six mailings, once a month to stores, offices, factories. They stress the need for competent, efficient workmanship. The first two mailings are made on the contractor's own stationery. Others are colored mailing pieces. Three contain self-addressed cards for the customer to mail, inviting the contractor to make a lighting survey, a general electric system survey or supply a free lighting booklet (imprinted with the contractors name).

Campaign B is directed to building contractors and stresses the electrical contractors on-the-job know-how. Campaign C, three mailings, is to engineers and architects, offering assistance in designing electrical layouts from a contractor's practical experience.

Oddly enough, duplication of mailings, a commonly expressed concern, never proved a great problem. In larger cities participants used a roster of their own customers, as a measure of public relations. Some contractors settled for one of the three campaigns. Many cut it more finely and selected only shoe stores, or drug stores, or large plants, or addressed within a few blocks of their own shops. Sylvania did all the printing, stuffing, typing and mailing. Job inquiries, though, came directly from customer to contractor.

As summed up by Bill Sears, Sylvania field representative, contractors are uniformly surprised to learn that a contract to use the lamp manufacturer's lamps or fixtures is not a prerequisite. He and the other Sylvania representatives who call on contractors state frankly that no one must expect the program to line up customers outside the door. What it will do is bring the contractor's name before people in his area who buy electrical service. It invites them to ask the contractor in to talk electric. "After that, it's all yours," Sears tells them. "If they need lighting, it's up to you to sell it. If they need a new wiring system, it's up to you to sell that. For those who use it, this canvass of results shows it does create interest and inquiries. For the alert contractor such door openings lead to sales and business."

ELECTRICAL WEST

Groundless Fears

HIDDEN away almost as obscurely as an unwary buzzard caught in the mushroom cloud of a Nevada atomic bomb test is an objection voiced by the Atomic Energy Commission against the Priest Rapids project on the Columbia River. The dam, the AEC says, would represent too great a threat to the huge Hanford plutonium works. A single atomic bomb might reduce the dam to a shambles and the resulting "150-foot wall of water" would catastrophically cover the plant before it could be shut down. Such reasoning is highly implausible. Except in the narrowest kind of a canyon, water doesn't travel in walls. In the distance between the damsite and Hanford the water would spread out to only a fraction of the 150-foot depth. And why would a potential enemy pick the dam as a target when the Hanford plant itself is so much larger and more vulnerable? In considering appropriations for the Priest Rapids project Congress might well tell the AEC to stop worrying about bomb-created floods and consider how badly the Pacific Northwest needs additional power resources.

Inequity and Iniquity

NOTHING has done more to bring public attention to the inequities and iniquities of the preference clause in the distribution of federally generated power than the imposition of surcharges on the bills of customers of investor-owned utilities in the Pacific Northwest. These companies were caught in the jaws of a nutcracker during the winter power shortage. They owned most of the steam-powered reserve plants. They operated these plants around the clock and poured much of the output into the Northwest Power Pool. Even steam plants owned by public systems operated for the account of the private companies. By taking on the full burden of steam generated power they built up extraordinary costs totaling $6,000,000. For financial relief they were granted surcharges ranging from 11 to 20% to be applied until the costs were returned. Customers of public utilities as well as industrials served directly from the Bonneville lines, although benefiting from the additional power supplied, were relieved from the cost burden.

The inequity is clear. The cure is not. BPA feels that some of the extra cost rightfully should be absorbed by it. However, there is no legislation to permit this.

So the customers of the investor-owned utilities pay twice for the benefits that publicly served customers enjoyed—once in the extra cost levied in the surcharge and again in the 20% tax differential which they contribute to the public welfare.

Secretary of the Interior McKay is aware of this great disparity. He says he will propose legislation to fix it. Until he does, the inequity and iniquity will continue to exist.

Progress Takes Time

A RECENTLY returned Pacific Coast visitor to Europe hopes that his wife never sees the galley of the new *S.S. United States.* In a personally conducted tour of the ship he was shown a battery of Radaranges whose performance, to hear him describe it, was miraculous and magical. High-frequency, high-speed cooking enables the chef to fry an egg in 12 seconds, a pork chop in 50; bake an apple in 1 minute, reheat an apple pie in 12 seconds and put together a ham and egg sandwich in 25 seconds. His description brought to mind the ghost of a so-called "miracle range" in the basement of the Seattle City Light building some 15 or more years ago. It and its inventor were simply way ahead of their times. But then hasn't that been the experience with many of today's popular and accepted electrical appliances?

Another example is reverse-cycle heating. Some 20 years ago we ran articles on it to start further exploration. Many trial installations have been made, much data collected. Now at last there is real sales effort behind it and perhaps it has arrived.

EDITORIAL VIEWS

You Can Say That Again

THE maintenance of a constant supply of electricity is absolutely essential to the maintenance of food and water supply, medical and hospital services, transportation, communication, operation of thousands of electrified farms, and all production and distribution machinery in this community....

The so-called "right to strike," however it may be justified as applying to other less vital industries, has absolutely no justification in this industry because the employees of this public service agency are occupying quite as much an office of public trust as are firemen, policemen, or any other necessary public servant. While the company management will do all possible to maintain its service, this very dangerous threat of disaster to the company and life of this community should be a matter of first concern to all governmental agencies—federal, state and local. We are faced with reckless and irresponsible action by a small handful of men who are exercising terribly dangerous power without responsibility. . . .

This is not a strike against a "private company"; it is a strike against every home, school, defense plant, hospital, shop, store, hotel, farm, and the employment upon which three million southern Californians are dependent. It is an attempt to impose the irresponsible will of a mere handful of union leaders and agitators upon the public by threatening the life of that public. It is a threat made not to enforce or protect any important principle, but to extort from the Edison company management a promise to do that which management has no power or authority to do....

The calling of a strike sets loose lawless and destructive forces in the immature and emotionally unbalanced men who always assert themselves in such periods of civil commotion, and those who authorize strikes must know such will be the effect of the cause they have previously set in motion. . . .

. . . I want to emphasize that this very present danger to the economic life of southern and central California represented by the strike called by a reckless, irresponsible and emotionally unbalanced man rests squarely upon the federal government. That government created the situation which makes it inevitable that this kind of power without responsibility will be exercised by just such men, and if loss of life and property results from this strike, it is those who placed control of the weapon in such hands who must be blamed.

I repeat that for government to authorize or permit a conspiracy to prevent delivery of electric service, stoppage of which immediately jeopardizes life and property, is simply an utter failure of government in its first responsibility. There positively can be no such thing as a right to strike against life, health and safety, and when government makes such a conspiracy possible, the very foundations of government are in a serious state of disintegration. . . .

. . . The federal government having created this Frankenstein . . . cannot now rid itself of responsibility by saying to the states that they should pass laws against the acts and course of action to which this Frankenstein is inevitably committed . . . Only by depriving these union bosses of that excess of power with which they should never have been entrusted, can the federal government partially correct and atone for its sins of omission and commission.—W. C. Mullendore, president, Southern California Edison Company, in telegrams to various public officials relative to the March strike against that company.

Smalley Adams

Lee Longley

Crellin Rheingans

E and O Meeting Was Small but Good

Quality of program more than made up for the smaller than usual attendance at the Engineering and Operating Section meeting of the Pacific Coast Electrical Assn. held in Long Beach, March 5 and 6. Threatened strike of electrical workers on the Edison and California Electric systems kept representation from these two utilities to a fraction of normal. President D. D. Smalley, in opening the session, complimented the section on an excellent program and said the meeting would go down in the annals as one of outstanding accomplishment.

As an opener for the entire group in general session Harry A. Lee, PG and E, discussed the recent Northwest power shortage. He was power administrator for DEPA in this winter's power crisis in the Northwest. To get by until the mid-January rains, it was necessary to curtail peak on the 5,500,000-kw Northwest Power Pool by 560 mw and to cut industry using more than 8,000 kwh a week by 10% for a total energy curtailment of 100,000,000 kwh per week. High steam costs and the preference clause worked hardships on the private utilities up north.

In a luncheon talk, Anthony Hunter, Southern California Edison Co., substituting for T. M. Leps of the same company, commented on California earthquakes as they may affect an electric utility. Drawing largely from Edison experience, he said that most power plant structures are built well beyond earthquake requirements; that power transformers should be firmly attached to concrete pads or, if car mounted, the car should be welded to the rails.

Every one of the nine groups comprising the E&O section had a bang-up program on timely topics and problems with a number of eastern visitors participating. A resume of the meetings of each group follows.

Communication

T. A. Phillips, Sponsor

Simultaneous microwave tests on 960 and 2,000 megacycles over identical paths were described by R. C. Cheek, Westinghouse. The test is presently being conducted in the Pittsburgh area over a 21-mile path. Briefly, the 960- and 2,000-megacycle equipment including the antennas are so arranged that both have, for practical purposes, identical paths. Adequate facilities are provided to record any fading or signal-strength changes. A record of weather conditions is also maintained. To date, after only a few weeks, the test has revealed no significant changes in signal strength and none are anticipated until the summer season, if then. Consensus of the group was that the test had not run for a sufficient length of time to be of value in determining the merits of one frequency over the other.

In the second talk by Cheek a great deal of test data was presented on antenna patterns for both the E and H plane. The conclusion reached was that before an antenna was installed a field-strength pattern for both the E and H plane be obtained either from the manufacturer or from tests. From the pattern one could determine how close antennas could be spaced and the minimum angles.

K. E. Dueker of Southern California Edison discussed "Economics and Reliability as a Basis of Section of Microwave, Carrier or Land Lines for General Communication Use." It was pointed out that economics dictate land lines for short lines with few circuits, carrier for a little greater distance than land lines and microwave for still greater distance with more circuits. The exact breaking point must be determined by each user's calculations based on his own construction costs.

Microwave survey methods were discussed by R. L. Brinton of PG and E. In his opinion use of the absolute altimeter is the most reliable method.

F. M. Irish of Arizona Public Service Co. discussed teletype application on utility systems. He said that where there was a medium amount of traffic that could be handled during the day a teletype was probably the cheapest means of communication.

A presentation was made on the electronic fault locator. Decision was that the radar type had a lot of merit and should be further developed.

Engineering Design

R. A. Bowman, Sponsor

During the engineering design group sessions W. H. Ness, Bechtel Corp., reported that Gadsby Unit No. 2 of Utah Power & Light had gone into operation and it had been found that operation of a modern reheat station such as this one involved little more operating complexities than does a standard nonreheat plant.

W. E. Cheney, PG and E, and J. E. Kerr, Bechtel Corp., reviewed the research program that had been carried on at Contra Costa steam station of PG and E on the reduction of game fish mortality. This program has been successful in reducing the mortality of fish entering the system from 65% to less than 2%. Much of the knowledge gained will be of use in other hydraulic systems.

The design of underground substations was described by O. R. Bulkley and R. B. Pollock, Southern California Edison. Attention was drawn to the

Phillips Collins

Savage Irion

Hathaway Lawson

value of such a design for congested areas where zoning laws and high ground cost make conventional outdoor substations undesirable. A substation was reviewed that had met an external noise limitation of 50 decibels.

It was brought out by H. A. Langston, Westinghouse, and R. B. Barton, G-E, that the low first cost of gas turbines is earning them a position in the gas pipe line pumping field and as motive power on railroads. There have also been a few central station applications where low fuel costs and load factors, or both, have justified the use of gas turbines.

The burning of some of the fuel oil now on the market causes hard slag to build up on the surfaces of boilers. F. M. Iwerks, Babcock & Wilcox Co., reported that work has been done by his company on the use of additives to make this slag friable and easy to remove. Experimental work along this line has been quite promising.

The reduction of service failures of alternating-current machinery by means of periodical high-voltage testing was discussed by E. A. Crellin, PG and E, and C. L. Sidway, Southern California Edison. Both alternating- and direct-current systems of high-voltage testing were described and the advantages and limitations of each were brought out.

Hydro Generation

F. I. Lawson, Sponsor

The hydro generation group took for its main discussions the subjects of automatic hydro plants (including the related matter of developments in governors) and turbine developments.

Initiating the program, John E. Bussi, PG and E, gave a comprehensive outline of the types of controls used in effecting semiautomatic, fully automatic and supervisory control of stations. Among the 59 hydro plants operated by his company, he pointed out that eight are now on a completely unattended, fully automatic basis, one of them 30,000 kva in capacity; 18 are unattended but require manual attendance for restarting after normal or trouble shutdowns; and of the eight fully automatic stations four have supplementary supervisory control. Methods of protecting the unit during starting and running were described, as well as some of the special operating requirements calling for ingenious designs, and methods of controlling load and regulating water levels.

F. J. Zircher, service manager for Woodward Governor Co. of Rockford, Ill., supplemented Bussi's talk with a description of the available devices that are used to facilitate automatic control.

Discussing modern trends in turbine development, W. J. Rheingans of Allis-Chalmers, Milwaukee, spoke first of the stimulated use of fabricated parts in turbine manufacture, citing examples of the improved methods now available. He also described the results of research and development his company is making in reversible units for pump storage plants and the promising field this offers for acquiring peaking capacity under certain conditions, illustrating the point with model test data. An interesting phase of this development was the proposal backed by experimental work of operating the unit at one speed when generating power and another when pumping.

In an interesting summary of the various types of draft tubes in use at the hydro plants of PG and E, E. A. Crellin pointed out the trend toward lower turbine settings. He cited the success obtained with some of the special draft-tube forms brought out 20 to 30 years ago, but less frequently used in recent years because of their additional cost.

At another session Crellin showed some interesting slides of a recent impulse wheel failure at Bucks Creek power house, caused by the fracturing of the wheel disk. The discussion brought out features surrounding the disaster and the underlying causes.

The growing use of Kaplan turbines for heads ranging up to 200-250 ft was pointed out by G. C. Hockwalt of S. Morgan Smith Co., York, Pa., in his presentation on developments in this field. This was brought out against the background of the rapid development of this automatically adjusted-blade type of unit, with its valuable characteristics of uniformly high efficiency over a wide range of heads and available overload capacity for emergencies when higher cavitation may be justified.

The sessions closed with contributions on the subject of tunnel and flume operating problems by Malcolm Bridgewater of Arizona Public Service and W. C. Cheney of PG and E.

Meter Group

A. D. Irion, Sponsor

R. V. Jones, H. W. Welton and E. W. Trenkle, the respective chairmen of the Western Utilities Electric Service Standardization Committee and Pacific Utilities Electric Service Requirements Coordinating Committee, Californa and Arizona groups, reported on the many electrical service requirements that have been standardized, particularly switchboard sections. Not only have better relations been obtained with customers and contractors but considerable savings in initial cost have been effected.

Reporting for F. A. Redding, national chairman of the meter and service committee of the EEI, A. D. Irion stated that results of the organizational plan adopted two years ago have permitted greater participation by individual members and streamlined the reaching of agreement on the various subjects.

Evaluation of meter accuracies and trend toward elimination of reduction of shop acceptance testing was discussed by M. A. Fredrickson, Southern California Edison Co., and F. B. Breedlove, San Diego Gas & Electric Co. They outlined the methods used by their respective companies in evaluation of meter accuracies with particular reference to "as found" tests on new watt-hour meters. Many factors must be taken into consideration and the conventional use of average accuracy and accuracy distribution as

Light Mack

Bryan Anderson

Bowen Ingraham

generally applied to statistical analysis of quality control can be used as a working tool on evaluating meter accuracies. The reduction in shop acceptance testing methods depends to considerable extent on the elimination of the many defects and irregularities found on new meters, caused by rough handling and vibration occurring during transit.

Testing of demand registers, thermal and mechanical, in the shop and in the field was covered by E. W. Trenkle, Arizona Public Service Co., H. D. Noren, Coast Counties Gas & Electric Co., and G. E. Link, Southern California Edison Co. Operating experience on the various types of demand registers was summarized. In general, the thermal type is favored where demands are relatively small and maintenance costs are an important factor. Mechanical registers have been improved in recent years and maintenance costs have decreased. Such registers satisfactorily record the demand of heavy loads of short duration. Discussion brought out that demand meters with various companies vary from ½% to 5% of the total meters in service.

High-voltage metering at voltages of 69 to 230 kv was discussed by K. M. Stevens, Southern California Edison Co. He commented on the many complications that can occur on this type of metering when proper consideration has not been given to operating conditions. Metering on the high side of autotransformers and tap changing transformers under load requires special study. In many cases ratio and phase angle tests of the instrument transformers must be made in the field where a high degree of metering accuracy is required.

Over-all vs secondary testing of instrument transformer metering was the subject of a discussion led by W. N. Lindblad, PG and E, and J. T. Stocks, California Electric Power Co. Practices of their respective companies were reviewed. Companies using secondary testing on the basis of reduced testing costs now consider that a combination of both over-all and secondary testing has definite advantages. The use of high-accuracy split-core testing transformers can be safely used on installations where a minimum of extra expense is necessary to provide space for a cutin. Coded secondary wiring and test switches are a must from the safety standpoint whether over-all or secondary tests are made, particularly on demand metering installations, they said.

Overhead T & D

E. R. Davidson, Sponsor

Aluminum for distribution conductors was the first topic discussed, under the leadership of H. E. Jung, Southern California Edison Co., and T. A. Bettersworth, PG and E.

Practices of most utilities with respect to conductors, conductor sizes, stringing sag and armor rodding do not differ greatly. Compression-type splices are currently in general use with certain utilities experimenting with preformed splices. Presently, the greatest difference in practices exists in the type of connector used. Some felt that there was too much concern over connectors, but it was generally agreed that the connector problem still needs more research. Bettersworth indicated that there was a good possibility that EEI would sponsor a research project to determine what constitutes a good aluminum connection and to develop specification for the design and installation of aluminum connectors. A majority felt that a protective coating of oxide inhibiting grease should be placed on all connections. Arizona Public Service has standardized on the use of aluminum aerial cable for secondaries. This, under the rules of General Order 95, cannot be attached directly to poles in California.

Recent earthquake damage to distribution transformers and methods of minimizing damage in the future were discussed by P. C. Oldershaw, PG and E. He spoke of the troubles that befell Pacific Gas and Electric Co. with respect to its distribution transformers during the earthquake on July 21, 1952. A total of 846 transformers was damaged to some extent when shaken off transformer structures. In order to minimize such damage in the future, PG and E is adding timbers on either side of the transformers at about two-thirds the transformer height.

Leaders for the television problem were A. Seidl, PG and E, and E. H. Clark, Southern California Edison. The importance of hardware clearances in line construction to minimize interference with television reception was pointed out. It was also shown that ordinances of certain cities governing the installation of television antennas were a step in the right direction. In the light of the number of fatalities that have occurred when antennas have fallen into the supply lines, it was felt that such ordinances should be encouraged in all areas. Problems involved in locating television distribution circuits on utility poles were discussed.

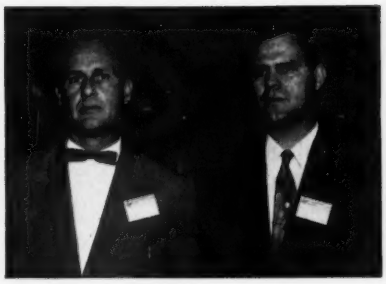
Modern transmission line design discussion was lead by Jordan Lummis, Southern California Edison, and E. G. Lambert, PG and E.

Lummis discussed the use of a low-cost 66-kv steel power line to replace a wood pole line in a high-fire hazard territory. Lambert spoke of the wood pole structures used by PG and E for its 60-kv line.

Comment on the practical application of ASA Standards C-57.32 was made by C. J. Nevitt, San Diego Gas & Electric Co., and H. E. Jung, Southern California Edison. Based on actual experiences of utilities where the loss of distribution transformers from all causes has averaged less than 1% and where studies indicate the corrected life of distribution transformers approximates 35 years, it was not felt that the additional expense involved in determining benefits of thermal loading based on ASA Standards C-57.32 is warranted. Utilities will undoubtedly continue to overload distribution transformers by approximately 25% on the average.

Paul Suransky, PG and E, and G. E. Jenner, San Diego Gas & Elec-

Lunge Canady



Trenkle Breedlove

Davidson Bowman

tric, were the discussion leaders on operating experience with overhead lines in areas classed as light loading but subject to occasional snow loading.

Certain areas in northern California classed as light loading actually experience frequent and occasional snows. Present practice is to design lines in these areas for light loading with limitations on span length and vertical separation between conductors to minimize failures. In the southern part of the state, snow loading of conductors in light loading areas occur so infrequently (approximately every 10 years) that it is not economical to construct overhead lines for conditions other than light loading.

Experience with overhead banked secondary systems was discussed by E. H. Clark, Southern California Edison, and C. B. Nelson, PG and E. Benefits derived from banking secondaries are: better average voltage condition; reduction of voltage flicker; improved service reliability; savings in transformer capacity; reduced secondary copper size, and ability to handle load growth easily.

Harry Pavne, Pacific Telephone & Telegraph Co., led the discussion on clearing rights-of-way by means of chemicals. Application methods are the key to successful gaining and maintaining control of brush on rights-of-way. Supervision with respect to thoroughness of application, mixture, quality, damage complaints and before-and-after photos are important in establishing a program of chemical brush control. Based on AT&T experience, a two- or three-year initial treatment may be effective up to 10 years. Studies indicate that up to a 55% saving may be realized by using chemicals as compared to cutting.

Steam Generation

C. L. Hathaway, Sponsor

Noise control was discussed by O. H. Hedrich of the Fluor Corp. He explained the theory of noise and its measurement, and outlined several noise problems and their solutions. W. S. Brouse, Westinghouse, explained how the design and use of fans and air ducts affected noise. The use of mufflers and insulation was reported as very effective in reducing the noise from safety valves and blowdown stacks.

W. H. Ness of the Bechtel Corp. discussed the design features of the Gadsby No. 2 unit (reheat machine), Utah Power & Light Co. Essential features and design considerations were pointed out. No operating difficulties have been experienced either at start-up or during normal operation. Quick pickups and system disturbances have given no trouble. Data for minimum start-up time and rate of loading are still being collected.

Kenneth Campbell, San Diego Gas & Electric Co., told about experiences in the use of metal spraying. Various types of repairs have been effected on turbine and pump parts and much confidence has been gained in the use of this method. Several procedures were discussed and some interesting applications of metal spraying were disclosed, such as spraying substation structures, irrigation gates, stacks and pump impeller coatings.

In describing the demineralizer used at the Highgrove plant, H. L. Warden, California Electric Power Co., pointed out that operation and control were quite simple and results satisfactory. The operating cost of treating well water was about 70c per thousand gallons, with silica control to .02 ppm. Discussion brought out that there is no simple highly accurate test for silica measurement.

The system by which the Southern California Edison Co. hires and advances power plant personnel was explained by W. R. Gould. The company has been able to maintain a minimum requirement of high school education for all power plant personnel and a BS degree for all its technical group. An attempt is made to pair technical and practical men and choose men for supervisory positions from both groups. An annual interview is given each employee.

L. F. Richardson of Bailey Meter Co., reporting on a survey of several hundred units involving variable-speed drives, showed the heavy trend toward the use of hydraulic couplings, especially in connection with boiler feed pumps and induced draft fans.

Cooling tower experience was presented by E. J. Huskison of Arizona Public Service Co. He briefed the company's five-year experience with cooling towers in the deserts of Arizona, where extreme temperature conditions are a real problem. Fans and fan-drive equipment are the sources of greatest operating difficulties.

H. L. Warden explained a device for satisfactorily feeding acid, in which flow is controlled by a valve admitting air into a closed feeder tank. None present had had experience with sulfur burners.

W. D. Elston reviewed PG and E efficiency test procedures and detailed one problem involving a 16-day test of an 850,000-lb-per-hour boiler using flue gas recirculation for control of superheat and reheat temperatures.

Substation Group

P. L. Savage, Sponsor

The first talk on the subject of earthquake problems by M. L. Crum, PG and E, related primarily to the disastrous Arvin quake of July 1952 and the results of that quake as they affected PG and E electrical installations. It was pointed out that 848 distribution transformers from 37.5 to 100 kva, platform mounted but not anchored, were thrown to the ground. In contrast to this, he mentioned that very few pole-mounted units were lost. Major substation damage occurred at Wedpatch, San Bernard, Wheeler Ridge, Lakeview and Old River stations, all in the vicinity of epicenter of the fault. Supplementing his talk with actual photographs of the damaged installations, Crum reviewed conclusively the extent of damage to each station amounting to toppled transformer banks at Wedpatch to lesser

damage to bus and steel structures, disconnects and building foundations at other stations. Emergency measures put these installations back in operation within a 24-hour period. W. T. Babcock of the Southern California Edison Co. commented on damage to electrical installations from earthquakes and pointed out his company's efforts to anchor equipment. Floor members stimulated an interesting discussion pertaining to the economy and justification of special anchoring means leading to the general conclusion that no amount of anchoring will insure against severe damage in case of large shocks.

M. H. Hobbs, Westinghouse, presented a story on trends of European switchgear design based on his observations abroad. He stated the use of factory-assembled unit equipment is not in use as we know it here, while breaker ratings are approximately one-fourth as great; a different series of distribution voltages is used and a higher voltage is employed for indoor equipment with potheads being used extensively at 440 v. Protective relaying is similar to ours but not the variety with considerable direct tripping from CT's in use. Open-type construction of generator voltage switchgear is prevalent with no isolated phase used. While porcelain-clad oil-breaker equipment is manufactured, their air-breaker design seems to be lagging. At the higher voltages, where we are considering 25,000,000-kva interrupting duty at 330 kv, the European designers are only looking up to this figure.

C. D. Mack, San Diego Gas & Electric Co., R. F. Stuart, PG and E, and W. T. Babcock, Southern California Edison, with aid of colored slides, described features of the mobile-unit equipment currently in use on their respective systems and procedures employed in utilization in substation operations. All speakers emphasized the point that this mobile equipment fits ideally into a program of station rebuilds and additions on planned schedules. At the present time, mobile units are being employed largely for that purpose instead of an emergency measure, as was the intention when originally purchased.

The story of capacitor switching and regulation on distribution systems was presented by B. H. Sexauer, Coast Counties Gas & Electric Co., R. B. Kimball, General Electric Co., Harold Zamzow, Line Material Co., and R. C. Scott, Westinghouse. Sexauer commented on the purpose and application of capacitor use to cut down voltage spread on feeder lines between substation and load center.

Kimball mentioned that capacitive current interruption is generally limited to normal bank load current and indicated that transient overvoltages may result to cause restrike in disconnecting capacitor banks. It was pointed out that in energizing banks, transient voltages approximately two times normal can occur along with inrush currents depending on size of bank and duty at the bank location. Flicker has not been a problem in switching of capacitor banks. Design of capacitor switches should embody ruggedness to withstand frequent operation, have a continuous current rating of 135% bank rating and be suitable for the circuit voltage. Types of control being considered were mentioned, including voltage, current, rkva and time switch.

Zamzow emphasized the two distinct advantages of switched capacitor installations obtainable, namely, materially improved regulation and economic benefits to be realized. The problem of switching is one of economy with type of control used depending on circuit conditions. Special emphasis must be given to coordinating voltage-type control with feeder regulators.

Scott discussed the subject from the standpoint of application control and switches, closely paralleling comments of previous speakers. He emphasized further that the proper application of a control, other than voltage or current, requires an accurate evalution of system characteristics. Use of contactors predominates for capacitor switching below 600 v, air or oil breakers above 600 v and oil breakers exclusively above 22 kv. His remarks touched on the industry's effort to combat the problem of transient overvoltages in switching. Efforts have taken the form of a resistor installed in the breaker that effectively is placed in series with the arc to prevent occurrence of excessive voltage surges.

P. H. Light, representing the electric utility engineering department of the General Electric Co., discussed four methods of system grounding from the standpoint of economy, faults, overvoltages and relaying. Included were the isolated neutral system, the high-impedance grounded system, the unigrounded system and multigrounded system. With the use of a portable indicating instrument, he was able to demonstrate effectively the relative magnitude of overvoltages that can occur. The general conclusion reached in his analysis bears out the fact that any system has certain distinct advantages over any other one method of grounding, depending on the criteria considered.

In covering his subject on supervisory control, W. F. Clare, Southern California Edison, described the types of equipment currently in use on his system and detailed operating history. He pointed out that the weakest point in the supervisory system is the open pilot wire channel that is susceptible to frequent outage as a result of adverse weather conditions. This is attested to by the fact that of the few outages occurring on the microwave system, none were attributed directly to the channel, most being the result of electronic tube failures. He mentioned further some minor redesign of equipment in the field to adapt it to his system to meet specific operating requirements. In this connection the necessity of close cooperation between manufacturer and user was emphasized to resolve mutual design and installation problems to obtain the ultimate in efficiency and reliability.

Forest L. Barker, California Electric Power Co., mentioned the two types of supervisory control in use on his system, with special emphasis on maintenance. His company's use of supervisory is relatively new and techniques of maintenance are not too highly developed. Difficulties to date have arisen largely in connection with installation of new equipment and have fallen into the category of telephone interference, signal attenuation and carrier-current adjustments. He pointed out that a maintenance routine is currently being programmed to include a periodic cleaning and adjustments of relays. An interesting floor discussion resulted on relay adjustment with George Lunge, G-E, commenting that in the interest of increased reliability such adjustment should be kept to a bare minimum and performed only as necessary in the event of complete equipment failure.

System Operation Group

I. W. Collins, Sponsor

The difficulty of forecasting loads accurately immediately following World War II and during the upswing following the Korean incident was explained by W. A. Andree of the Southern California Edison Co. and W. W. Vaughn of California Electric Power Co. Discussion covered different methods used by planning, operation, production and sales groups of the utilities, methods of forecasting for long-range planning in order that generating facilities might be available and short-time estimating methods.

Determining the needs of the industry and ordering equipment in suf-

ficient time to meet load demands were emphasized by Paul R. Thompson, General Electric, and R. W. McLean, Westinghouse. Past records of population growth in the Pacific coastal states and the outlook for the future indicate a sustained growth at above normal levels.

Planning the integration and utilization of resources was outlined by E. W. Messer, Southern California Edison, and Harold Pangborn, California Electric Power.

Forecasting Hydro Production

According to C. W. Foster, the April-August runoff forms the basis for forecasting the Mono Basin and Colorado River yields. These are the major hydro sources for the California Electric Power Co. and the Colorado River projects.

An unusual story of aerial snow surveys was presented by W. A. Lang, chief hydrographer of Southern California Edison, wherein snow depths at 2-ft intervals, indicated by measuring stakes with crossarms, are viewed and photographed aerially. Sufficient snow measurements are made to provide correlation of courses and to determine water content for appraisal.

C. R. Canady reviewed frequency and tie line regulation experience on existing installations between the Southern California Edison and others. He summarized the benefits as reduced frequency deviations, increased tie line loading and economical employment of generating units. Improved methods of tie line regulation and load allocation to generating units by employing differential selsyns were explained by G. S. Lunge, General Electric Co. of Schenectady.

High-Speed Reclosing of Oil Circuit Breakers

Development of high-speed reclosure of oil circuit breakers, the features embodied in design and the facilities now available were outlined by V. E. Kaste, General Electric Co. Comparison of European and American practices were outlined by M. H. Hobbs, Westinghouse. A. Scott, protection engineer, explained the unique methods required to test the facilities, the problems experienced and the successful results achieved on the PG and E 220-kv system.

Planning for Emergencies

D. A. Denholm, Southern California Edison, Frank Gaennae, Sierra Pacific Power Co., and R. V. Jones, PG and E, outlined the necessity of a program for routine as well as unusual emergencies. Discussion covered problems and effective operation during the Bakersfield earthquake, training for emergencies, keeping the program up-to-date and cooperation with other agencies in order to maintain essential services.

Underground Distribution

J. B. Bowen, Acting Sponsor

The underground distribution sessions were well attended but because of the illness of R. C. Blankenburg, J. B. Bowen was the acting sponsor for the group. Fred Hiller, Burndy Engineering Co., opened the program on aluminum conductors for underground installation. Aluminum-to-aluminum and the aluminum-to-copper splices were discussed in detail and a great deal of interest was shown, even with the lack of aluminum-conductor installations on the Pacific Coast.

Reviewing the early developments in cable terminations, A. E. Papp of the G & W Electric Specialty Co. brought out the theory of terminating cables and emphasized the use of stress cylinders for transferring stresses.

The San Diego Gas & Electric Co.'s colored movie film on the various steps showing the actual splicing procedure they use in making lead-burned or duct cable splices was viewed with interest by many of the operating companies.

Advantages and disadvantages of the various methods of fault locating, used by PG and E over the years, was presented by S. C. Anderson. He gave details of the successful application of the Biddle d-c impulse-type fault locator for locating faults and for proof-testing cable installations. Martin McGrath of the General Cable Corp. commented on the practices of other utilities and the current interest in the new radar method of fault location. The *safe* methods of locating leaks in lead-covered gas-filled and high-pressure pipe-type cables were discussed. Included were the technical aspects involved and the precautions necessary if tracer gases were to be introduced into the cable for detection and tracing to the leak by such means as a Geiger counter or other detection devices.

The Southern California Edison Co.'s experience with failure from electrolytic action on a cable installation of two circuits of single-conductor 66-kv paper and lead oil-filled cables was presented by F. B. Doolittle. The tests made and the steps taken to protect these cables were of great interest to many, especially the use of magnesium anodes.

Colored slides were used to illustrate the use of G & W type RA oil switches on 12-kv feeder cables in the Long Beach vicinity. N. K. Yarnell of the H. J. Randolph Co. described tests being made on 12-kv fuses in a submersible cabinet for use on 12-kv underground systems as protective devices for transformer installations. The economy, the simplification of system planning, the increased safety and the neater cable arrangement possible by substituting pull boxes for manholes in business districts were discussed.

At Sacramento Valley NECA officer installation dinner, new President William Cotter and Mrs. Cotter, at left; Rex Moore, meeting chairman, and Mrs. Moore; and retiring President Louis Stein, now a director. Not shown was chapter governor Frank Merwin

Phoenix meeting luncheon, of which Henry Sargent, Arizona Public Service president, was chairman, was typical of each one where—

PCEA MEETS THE PEOPLE

Redman lands; situation well in hand—

"Leave us face it," Vern Redman thought it up and Vern Redman put it over. He organized a traveling ball club, played the sticks and showed the locals what teamwork in the electrical game can do. As the manager of a small club has to do sometimes, he filled in to play any position, from pitcher to outfielder, when any of his team couldn't show. You have to be versatile for that and this year's chairman of the Business Development Section of Pacific Coast Electrical Assn. proved so.

Under his chairmanship, and with his string of speakers, six of the eight meetings to bring PCEA to its members have just been completed. (The strike in southern California caused cancellation of the Long Beach and San Bernardino meetings). They were uniformly well attended. At Stockton there were 232, Fresno 142, San Jose 252, Phoenix 235, San Diego 182 and Reno 175, at the luncheon or dinner, with a corresponding good attendance throughout the sessions.

In all some 1,278 people in the electrical industry in California, Arizona and Nevada were able to participate in a PCEA conference, something many never before had done. Best at any section conclave before had been about 350.

Each locality selected the parts of the total available program from the Business Development Section that it felt were most useful. The main luncheon talk, "Electrical Horizons of the West" was to have been given by George C. Tenney, editor, ELECTRICAL WEST; Ray Turnbull, G-E vice-president; or I. W. Borda, Okonite vice-president, all past presidents of PCEA. Tenney addressed the Fresno, Stockton, San Jose and Reno meetings. When Turnbull was called East and Borda was unavailable, Redman stepped into the pitcher's box, gave it his own windup and saved the day. Same thing when any of the panel of speakers was out. He filled in. And a summary of each presentation follows this box score.

Each committee of the section prepared a talk or presentation. One, two or sometimes three different people were prepared to give it. C. V. Soper, Southern California Edison Co., gave the *Adequate Wiring* talk at all meetings; Charles R. Long, Westinghouse Lamp Division, gave that on *Commercial and Industrial Lighting. Industrial Wiring* was given either by C. R. Benson or D. F. Flinn II, both of General Electric; *Power*

Tenney

Lambirth

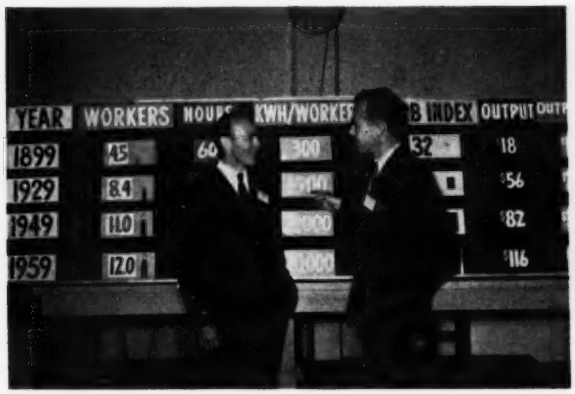
Christensen

Tallon

Lind

Sanford

Frost



Before power and worker figure chart stand Benson and Hoffman

Phoenix air conditioning: Donahue, Warren, Waggoner, Buckley

by Robert Hoffman and W. O. Kyte of G-E also. *Home Lighting* was presented by Douglas Aiken, PG and E, E. M. Tallon, Southern California Edison, or Al Reitman, G-E Lamp Division. The *Home Economics* program was given by either Clara Sherburne, Hotpoint, or Marjorie Helm, California Electric Power Co. Dorothy Huse of Sues, Young & Brown was to have given it at Long Beach. J. S. C. Ross, and Walter Lind, PG and E, gave the *Kitchen and Laundry* story. E. M. Frellson, G-E Supply, and Gene Whitworth, PG and E, were also to assist.

Some meetings had *Agricultural Power Developments* and a *4-H Demonstration*. Thor Christensen, PG and E, and Milo Cain, Coast Counties Gas & Electric, arranged for the latter. Ralph Parks, California Extension Service, and John Dobie, University of California, teamed up with a novel presentation on the former. Wilkes Lambirth, California Electric Power, made one presentation of the subject.

Television was handled differently in each place it was programmed, depending on the local situation. Speakers either presented short talks or acted as answerers to questions put to them by the audience or from previous surveys. In Fresno R. M. Sanford, Meyberg Co., and Robert Ham, Crosley, were programmed; Stockton, Walter Lind, PG and E and Larry Devlin, Westinghouse Supply; San Jose, Lowell Garrison, G-E Supply and John Stone, H. R. Basford Co.; Long Beach, Vern Moritz, G-E Supply; San Bernardino, P. L. Henry, Meyberg Co. and A. C. Cameron, Crosley; Phoenix, William Frost, Westinghouse Supply and L. H. Shaff, Arizona Public Service (Art Sprinkle, KPHO-TV took his place); San Diego, P. L. Henry and Lisle Shoemaker, KFMB; Reno, Harper Dowell, Philco and Mike Maier, Sylvania.

In Phoenix for *Air Conditioning* a special local panel of experts consisted of Richard Drover, architect, James Donahue, Climate Control Co., Cliff Warren, Johnson Bros.; Les Waggoner, and Towner Buckley, both of Arizona Public Service Co. In other localities Vern Redman presented a paper by George Zelhart of PG and E, Fresno, on the potentialities of the heat pump.

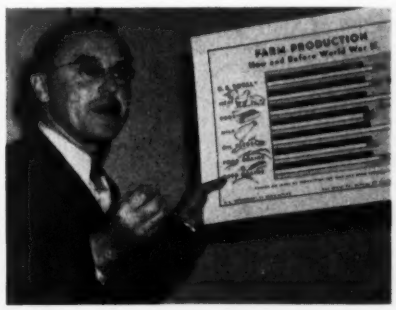
Regional meeting chairmen who scheduled the local affair, selected the playing field, made the local arrangements and acted as chairmen or co-chairmen were: Fresno meeting—Les Quinby, Edison, Visalia, and Redman, PG and E, Fresno; Stockton—O. E. Rush, Stockton and Larry Greer, Sacramento, both PG and E; San Jose—Douglas Aiken, PG and E, San Jose, Louis Wollenberger, Coast Counties Gas & Electric, Santa Cruz, and P. S. George, PG and E, Salinas; Long Beach—C. M. Campbell, Edison; San Bernardino—J. C. Meserve, Edison and Robert Neuman, California Electric Power; Phoenix—Jack Kiedaisch, Arizona Public Service; San Diego—C. M. Thompson, San Diego Gas & Electric; Reno—A. L. Pierce, Sierra Pacific Power Co., Reno.

W. L. Moats, section vice-chairman, Westinghouse Electric Corp., Los Angeles, participated in the southern California meetings. Victor H. Hartley, PCEA managing director, attended all of them and directors of PCEA served as chairmen of the luncheons or dinner meetings.

In brief, the matter covered in each of the presentations was:

Agriculture Needs Power

Grow more per acre with mechanization and better methods developed through research, is the only way America can feed its 175 million coming population, Ralph Parks showed by charts; also the growth in use of



4-H girls make a lamp; 4-H boys warn of overloaded circuits; and Ralph Parks charts agriculture's electric power mechanization

Wollenberger Redman Aiken

Page Kiedaisch

Bunce, Thompson

Rush

Greer

power and machinery on farms. It is increasing farm output and reducing hours worked.

John Dobie, working with Parks in a two-man repartee presentation, then illustrated a number of new farming techniques that power makes possible. First named was sprinkler irrigation. He cautioned though that it is but *one* method of irrigating, not the best for all places; that it may not do on hills or hardpan; it germinates weeds as well as seeds. It is not necessarily cheapest or best in water conservation. Other interesting uses shown by slides were: magnets to remove tramp iron from chopped hay or silage; liquid manure pumps; supplemental lighting for flowers; refrigeration of flowers to hold for market; materials handling; more mechanization in picking and handling of deciduous fruits and nuts; finishing chopped hay, crop conditioning with dryers and fans; rice dryers for the farm; refrigeration for bulk handling of milk and eggs.

At Stockton a 4-H group of three boys put on a clever demonstration of what overloading of circuits will lead to—it sets the house on fire. At San Jose, two 4-H girls demonstrated a project of making a planter lamp, explaining the details and costs as they assembled one.

Adequate Wiring Pays

"Where do you plug it in?" said Soper, is an apt name for the program necessary to make everyone aware of the need for more adequate wiring in order to enjoy, not merely look at, the many appliances available today. There are over 20 million inadequately wired homes. A program for the rewiring of them is needed. But there is an opportunity to show the building industry that wiring is just as important as any other feature of the house.

"Electrical usage in the home today is at least 20 years ahead of the average home wiring system. We think nothing of paying $190 to $300 for automatic shifting on our cars—but anything extra for wiring?"

After outlining the need for such wiring by showing the number of appliances used today in each of the rooms of a home, and telling of the benefits in safety, convenience and resale value, Soper urged all to seek the advice and help of the adequate wiring advisor of the serving utility.

Air Conditioning Trends

The heat pump was under consideration as the most promising means of obtaining both winter and summer air conditioning, after a review of the various methods used for cooling, from palm leaf fan to desert cooler to heat pump packaged unit, in a paper by George Zelhart, presented by Redman at most of the meetings. Copies of it, with data as to costs and operating load factor, were passed out at each meeting. Comparative costs of oil- or gas-fired installations are favorable to the heat pump.

With a maximum demand of 4.7 kw and approximate annual kwh of 11,800, a heat pump compares with an electric range as follows: connected load, one-fourth as much; demand about the same; annual kwh 800% greater.

In Phoenix, a prime market for air conditioning, a panel covered the several aspects of air conditioning, then answered numerous questions from the floor. Richard Dover, architect, began by saying that control of conditions made hot regions hitherto hard to live in more habitable. James Donahue, contractor, felt that the evaporative cooler, a godsend at the time, led people to want refrigerated systems. Packaged window units, he thought, would sell best through appliance dealers but would create desire for complete home systems the contractor could sell and install. Cliff Warren, Johnson Bros., told how to avoid trouble by selling enough capacity to overcome reduced initial efficiency; proper design of ducts to reduce air noise and prevent drafts. He gave numerous practical suggestions on installation details.

Les Waggoner, Arizona Public Service, covered utility line extension policy and wiring problems. Before selling 3-phase jobs that would call for utility line rebuilding he urged checking in advance. Small single-phase room coolers, he said, should have a circuit of their own if expected to perform satisfactorily and dealers should sell the idea. Towner Buckley of the same company gave cost of operation figures for packaged units, including both water and power cost. Roughly, in Phoenix he estimated it would run about 23c per day per ton, half of that cost being for water, half electricity.

Home Light Conditioning

How model demonstration homes, adequately wired and light conditioned, are successful in selling whole tracts of such homes and of influencing the entire community toward improved home lighting was told with examples. After listing the advantages to all and the films, literature and advertising available to tie in with such model home showings, these examples were cited. A builder, who had been used to spending $15 per home for lighting fixtures, was persuaded to build such a model home. He went all out, did a lot of promoting, had 20,000 people go through the home and contracted for $250,000 in new homes similarly equipped. Several other examples in northern and southern California were given of this successful means of promoting better home lighting.

How Home Economists Help

"Don't underestimate the power of women" the home economists told each meeting. In doing so they recalled the various things the women have done to aid selling. Mentioned were the home equipment workshops for home economists and demonstra-

Stone

Garrison

Soper

Long

Kyte

Reitman

tors and teachers of home economics. A guide book on classroom demonstrations has been prepared and a text "Know your electric range." They conducted meetings for dealer salesmen in southern California. Home demonstrations, they said, have reduced service calls. A recent distributive piece was prepared by them to help sell home freezers. Latest activity has been the establishment of a job placement bureau for girls with home economics training.

Kitchen Door Opportunity

To show that a tremendous market still exists for appliances in the kitchens and laundries of homes in the very service area in which the talk was presented, a slide-illustrated talk was given at each meeting, tailored to that locality and its local promotions and programs. To set it off, a contrast was made between the kitchen and laundry of 1901 with its sales potential limited to $24.57 and 70 kwh per year and that of 1953 with a potential of $4,301 and 10,125 kwh. After reviewing the local program the speaker then went on to remind of many things dealers themselves could do, such as tie-in advertising, sales training, direct mail, attractive stores, displays, participation in fairs, etc. Illustrated were examples of servicemen trained to sell, packaged kitchen deals, cooking schools in a dealer's own store model kitchen.

Commercial-Industrial Lighting

Proof from actual testimonials of proprietors and managers of stores, offices, buildings and industrial plants were used by Charles Long in the contention that "good lighting doesn't cost—it pays." The lighting committee had surveyed 40 cases, which he showed in slides. Then instead of giving much description of the lighting equipment, he read off the satisfied comments of these men as to what the improved lighting did for their businesses. The examples shown were all of typical small or medium-sized places such as contractors and utility find in each community.

Commercial and Industrial Wiring

Entire presentation on this subject was confined to showing the advantages of the "Wye System," of 480/277 volt, over conventional systems, for better service, reliability and safety in industrial and large commercial buildings where feasible. It was shown to cut number of circuits in half, cost less, save $20 per kva. How it could be used and protected was shown in diagrams contrasting the "old usual" methods of circuiting and the same area covered by 277-v lighting circuits, with reduction in number and wire size and switching done with a 24-v relay system. A 480/120-v, dry-type transformer supplies convenience outlet circuits for business machines, etc. Savings were shown to be possible from load center distribution, smaller conductors and conduit, 24-v switchlegs. Plug-in busway, capacitors, fused combination motor starters with silver ferrule current limiting fuse, and other equipment that is new were urged for consideration.

School Lighting Potential

In the PCEA area of Arizona, California, Nevada and Hawaii, the school lighting committee estimates, there is budgeted for the next five years one billion dollars for new classroom construction, 56,000 classrooms. This means a market of $100,000,000 for electrical contractors, $60,000,000 for electrical materials, of which $10,800,000 is for lighting fixtures, $3,000,000 for lamps. It means an $18,000,000 annual revenue for utilities. PCEA proposes a research program at four universities at a cost of about $8,000 over the next year, by graduate engineering students, to provide data for architects, educators, engineers, the state division of school planning and school trustees.

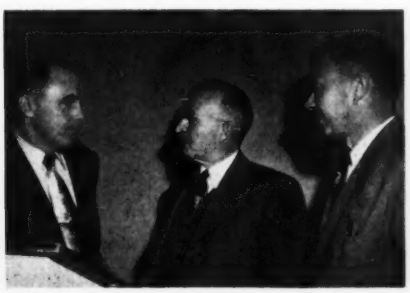
Commercial Power

That no amount of social legislation can increase living standards—it takes productivity—was proved on a flock chart in this presentation which gave the figures since 1899. In 1899 there were 4,500,000 workers, work-

Sherburne

Helm

Ross


Parks Cain

Dobie Henry Shoemaker

ing a 60-hour week, and only 300 kwh was used per man, turning out $18 in output or $1.13 per man hour. In 1949 11,000,000 workers on a 40-hour week using 13,000 kwh had an output of $82, or $3.75 per man hour. In 1959, it was predicted 12,000,000 workers, 38-hour week, using 20,000 kwh, would turn out $116 or $4.90 per man hour.

Slides were then shown of many ways in which power can be used still more to increase productivity and quality. Materials handling was told of as one of the most important fields. More conveyor systems, palletized loading with electric trucks, motor drives with more automatic and speed controls, better plant distribution, electronic process equipment, as well as use of electronic means for inspection were also shown. Finally it was shown how small a percentage of the cost of a product the electric power is compared to labor, raw materials, fuel, packaging, etc. More power use means better products at lower costs and a better standard of living for all—producers and consumers.

Television

A quick glimpse into the fabulous future of television, not only in home sets but industrial and commercial uses was given by television committee members at some meetings; at others a more local question and answer session was conducted.

Each television retailer was urged by the committee to utilize the services of the supplier more, attend sales meetings, service meetings, consult more with the field sales contact man of the wholesaler who has a wealth of knowledge of promotions that are working successfully in other areas. Too many lines was advised against. With fewer lines a better presentation may be made; there will be less obsolete merchandise to dispose of at the end of the year.

Where special TV problems of the locality were paramount in the dealers' interests it was endeavored to bring them competent opinion as to those particular problems.

Long Beach Luncheon

When so much of the executive personnel of Southern California Edison Co. was needed to keep the system operating under a strike it became evident attendance at Long Beach and San Bernardino would be seriously affected. But since arrangements had been made for a luncheon one was held at Long Beach and Redman and others of his troupe gave a short report. There was time enough to cancel the San Bernardino meeting.

Vacation—Convention Coming

Plans for work are well under way for the association's annual convention to be held at Hoberg's in Lake County, approximately 100 miles north of San Francisco, May 13, 14 and 15. With informality the order of the day, this convention promises to be one of the most productive and enjoyable the association has ever had.

Convention rates are extremely reasonable, only $10 a day, American plan meals included, at either Hoberg's, Seigler Springs or Forest Lake resorts reserved for the convention. Sports wear will be all that's needed.

General convention chairman is H. A. Lee, Pacific Gas and Electric Co. Convention committee chairmen are: program, George C. Tenney, ELECTRICAL WEST; stage manager, Carl P. McCarthy, Pacific Gas and Electric Co.; attendance, W. J. Maytham, Westinghouse Electric Corp.; banquet, K. M. Ryals, K. M. Ryals Co.; cocktail party, Marshall Lasher, Hubbard & Co.; housing, M. S. Barnes, General Electric Co.; ladies entertainment, F. E. Bodine, Westinghouse Electric Corp.; publicity, A. J. McCollum, Pacific Gas and Electric Co.; reception, Frank A. Tracy, Sierra Pacific Power Co.; registration, H. F. Carr, Pacific Gas and Electric Co.; transportation and general information, W. A. Hynes, Pacific Gas and Electric; ushers, Ellis Larkins, Pacific Gas and Electric.

Transportation details were not all settled when this went to press, but tentative plans call for a chartered bus to meet the Lark on Wednesday morning, May 13, in San Francisco to transport southern delegates to Hoberg's.

The possibility of operating a chartered airplane direct to Hoberg's from Los Angeles is being investigated, but this and other details will be included in the complete information that will be sent to all members.

Entertainment plans — again with the accent on informality — are fully under way. The Manufacturers' Cocktail Party and Annual Banquet will be held on Tuesday evening, May 14. Both will be strictly informal.

General sessions will start at 2 p.m. Wednesday, May 13, and will end at noon Friday, May 15. So far the program looks like this:

Wednesday, May 13, 2 p.m.

General Session, I. W. Borda, vice-president, Okonite Co. and director, PCEA, chairman

1. **President's Address,** D. D. Smalley, president, Pacific Coast Electrical Assn., vice-president, Pacific Gas and Electric Co.
2. **The New Washington Climate,** Raymond Moley, contributing editor, *Newsweek* magazine (tentative)
3. **California Ownership of the Central Valley Project,** J. J. Deuel, director, Public Utilities Department, California Farm Bureau Federation

Thursday, May 14, 9:30 a.m.

General Session, Henry B. Sargent, president, Arizona Public Service Co., and director, PCEA, chairman

1. **Symposium, Technological Horizons in Engineering and Operations**
   P. H. Adams, chairman, Engineering and Operating Section, PCEA, San Diego Gas & Electric Co., moderator
   Generation, W. L. Chadwick, vice-president, Southern California Edison Co.
   Transmission, J. F. Sinnott, system planning engineer, San Diego Gas & Electric Co.
   Distribution, T. A. Phillips, general superintendent, Arizona Public Service Co.
   Communications, R. H. Miller, general superintendent of communications, Pacific Gas and Electric Co.
2. **Address,** Robert C. Stevenson, executive vice-president, Allis-Chalmers Manufacturing Co.

Luncheon, 12 noon, K. M. Ryals, K. M. Ryals Co., chairman
Man, Commerce and the Commonwealth, Reverend Herman J. Hauck, S.J., president, University of Santa Clara.

2:15 p.m. General Session, E. D. Sherwin, president, San Diego Gas & Electric Co. and director, PCEA, chairman

1. **Here We Are and Where We're Going,** B. L. England, president, Edison Electric Institute
2. **Our Responsibility for Future Engineering Leaders,** H. N. Muller, assistant to the vice-president, Westinghouse Electric Corp.
3. **Developing the Managers of the Future** (subject tentative), Thomas M. Linville, manager, Development Service Department, General Electric Co.

Friday, May 15, 9:00 a.m.

General Session, D. D. Smalley, president, Pacific Coast Electrical Assn., chairman

1. **Back to Grassroots Selling,** speaker to be announced
2. **The Economic Outlook,** Dexter M. Keezer, director, Economic Staff, McGraw-Hill Publishing Co., New York
3. **Section Reports**
4. **Annual Meeting**

Adjournment

At the last meeting of the PCEA board of directors it was reported that the California Division of Industrial Safety is creating an Advisory Commission. They are willing to appoint a PCEA representative to the new commission, and President Smalley was asked to submit the name of an appropriate nominee.

Rogers Myers Rejda

EMEA Five-Ring Circus

Emphasis was on the five phases of an electrical maintenance engineer's job as the Electrical Maintenance Engineers Assn. of Southern California this year concentrated on a conference instead of a show, March 18-20, at Rodger Young Auditorium, Los Angeles. Five panels of experienced men conducted the forum-type conferences, which some 160 paid $15 to attend, and selected the subjects upon which they wanted information. The conference, though, was kicked off with a big dinner meeting attended by 346 and a small table-top exhibit of electrical products by 43 exhibitors lined one side of the hall and the back of the stage.

H. R. Meyer, manager of Maintenance Sales for Westinghouse Electric Corp., Pittsburgh, made a trip West to be featured speaker at the dinner. "Don't let your management be caught with their plants down," he said, might well be the theme of the conference. "Our research and design engineers can conceive an idea, lay it out on the drawing board, see that it is correctly built in the manufacturing aisles and to a great extent assist in its installation. But it takes the maintenance engineer to see that it is kept running with a minimum of down time and a maximum of efficiency for quality control.

"The old idea of 'wait for the ——- thing to break down and then repair it' is replaced with a new concept of preventive maintenance."

Meyer also set the theme of the conference by showing the importance of maintenance in conserving materials and resources, telling of developments that reduce maintenance — such as glass fiber insulations, silicones, thermoplastic coils, prelubricated bearings, all-steel motor frames, etc. The "screwdriver and oil can type" of maintenance is being replaced by (1) a skilled maintenance organization; (2) a schedule of inspections and (3) a willingness to take care of troubles before they occur.

Method of conducting the conference was this: Each of the five panels ran three consecutive and similar sessions on Thursday morning and afternoon and on Friday morning. At each session each of the panel members first presented a short resume of some phase of the major subject. At the end of these talks the remaining time was spent in questions and answers and exchange of experiences or methods. Any three of the five subjects were thus available to any registrant for the conference, or he could split his time among the panel groups as he chose.

Maintenance Records, Planning and Scheduling, was the phase covered by panel 1, of which John J. Singleton, chief electrician, Lever Bros., was chairman. On the panel were R. H. Disterdick, engineer and instructor of industrial organization; H. M. Eversz, plant engineer, McCulloch Motors Corp.; Henry Schumacher, chief electrician, Richfield Oil Corp.

Lighting Maintenance was the subject of panel 2, with Jack C. Cochran, building superintendent, General Petroleum Bldg., as chairman and on the panel, Benn J. Hartmann, manager, Flood-Lite Service Inc.; Robert Marcum, supervisor, engineering records group, plant engineering, Hughes Aircraft Co.; Foster K. Sampson, consulting electrical and illuminating engineer.

Maintenance of Electrical Equipment in Industry was panel 3's subject. L. J. Rejda, maintenance engineer, Westinghouse Electric Corp.., was its chairman as well as the general chairman of the conference. On his panel were E. J. Butland, general foreman, maintenance department, Lockheed Aircraft Corp.; Floyd Mayfield, foreman electrical department, Standard Oil Co. of California; R. C. Samuels, assistant chief engineer of maintenance, American Potash & Chemical Corp.

A second panel on the same subject was headed by George Larsen, electrical engineer and partner, Larsen-Hogue Electric Co. On the panel were Ray D. Dingler, in charge of electrical design, construction and maintenance, Monolith Portland Cement Co.; Ernest F. Donatic, general superintendent in charge of service, Kaiser Steel, and R. J. Kernaghan, foreman, electrical department, Goodyear Tire & Rubber Co.

Special Instruments, Tools and Methods Used in Maintenance was the subject of panel 5, with Jack B. Pitts, plant electrical engineering, Shell Oil Co., as chairman and with Howard Miller, engineer, customer equipment service, Los Angeles Department of Water & Power; Elmor M. Croft, owner, Croft Electrical Laboratories, and Paul Henrichs, assistant industrial power engineer, Southern California Edison Co.

Richard Rogers, Ace Day & Night Electric Co., president of EMEA, announced at the dinner meeting that the customary industrial electrical show, set aside this year, will be staged next year in March at the Shrine Auditorium.

The conference committee, headed by Rejda, had on it Jack Cochran, George Larsen, Jack Pitts, John Singleton and F. J. Rohring. Some of the papers presented during the conference will later be published.

● **Herbert Heinrich,** manager system operation department, Hawaiian Electric Co., spoke on low-voltage electrical hazards before the AIEE in Honolulu.

No Depression—Tighter Selling

Plenty of future promised San Diego dealers who learn about women and prepare to sell

Clary Rogers

Most useful and practical benefit brought to dealers who attended the winter conference of the Bureau of Home Appliances of San Diego County in Balboa Park, Feb. 18, was a simple, effective method to interview prospective salespeople. It was something dealers had been needing but nothing much has been available.

The form suggested and the method outlined are detailed in an article on p 124 following this interpretation of other usable parts of the fast, compact and informative afternoon and evening program. For the remainder of the program was informative and inspirational. It set a pace for the opening of spring and summer selling effort for dealers, distributors and manufacturers. Locally it announced a schedule of promotions and sales events and dramatized the part that each must play to bring success and profits.

Finance and Credit — To answer questions in every dealer's mind as to what to expect—whether credit would tighten up, whether there'd be a depression—as a result of a new administration with a new fiscal policy, Vic C. Eggerding, president, National Association of Credit Men, spoke. His answers: Controls? Not unless we get in trouble. The administration is dedicated to free enterprise. Also to oppose inflation. If inflation continues some kind of controls may be reimposed—probably on credit. Depression? It was predicted after World War II but did not come. Admittedly present prosperity is fallacious, it is based on war production plus consumer trade. Counterbalancing are new population, more babies, all consumers, not producers yet; plant capacity expanded but improved to meet competition; research, bringing scores of new products; people are buying the better quality, top models; aroused selling will help move the production to market.

Food-Freezer Plans and Prospects —Freezer selling has been through its second artificial boom, Amana Corp. Executive Vice-president George C. Foerstner said. Now sales are off as the cream has been skimmed by selling the prospects off too fast. The industry has to clean up the situation.

He suggested these steps: (1) Find out whether customers are pleased or not. (2) Make sure any food plan is a good and an honest one; not one that sets the expiration of the note two or three months after the food is used up; nor one that hikes up the freezer price; nor makes for kickbacks on first payment deals; nor one in which the customer finds he can replace the freezer for less than the unpaid balance. (3) Freezers should be sold by established appliance dealers, not fly-by-nights. (4) An educational program to inform the public and enlist their assistance in selling their neighbors the value of food freezing. (5) Outside selling by dealers, but margins must be increased to make such effort worth while. Despite a million freezer sales in 1952, there should be a million and a half sold in 1953, he concluded.

Any Future in this Business?—To scotch the perpetual pessimist who predicts an end to growth and prosperity, H. L. "Red" Clary, vice-president in charge of sales, Norge Corp., Chicago, spun enough scientific dream stuff now in process to cheer anyone with such a dour outlook. Heart of what he said was that the American system is still fluid and flexible and adjusts itself. The theory in America is that each individual looks forward eagerly to each new product and invests his money in it. Clary then swept the horizon of technological improvements in agriculture, finding of raw materials, new manufacturing methods, new materials, atomic power. What this all means to the appliance industry is that new features, new products, new appliances not dreamed of will be produced, offering continuous opportunity to dealers and salesmen.

Importance of Women — Making her last appearance as director of home economics for Admiral Corp., Willie Mae Rogers, it was announced by J. Clark Chamberlain, San Diego Bureau of Home Appliance manager, had just been made director of Good Housekeeping Institute.

Women, she told the large evening audience of some 500, are a dealer's best friend if he learns (1) how to get

Eggerding Stoltenberg Foerstner

her into the store; (2) how to treat her, and (3) how to follow up on sales. Women today, she said, are far more discriminating shoppers than formerly. If they seem a bit aggressive they may be getting even for being pushed around during the shortages. But they are looking for the right kind of dealer, with a good reputation, clean store, courteous sales people and honest policy. Women are the least objective persons on earth, she warned. Everything is personal. A woman puts herself into every picture. When she buys an appliance what interests her is what it does for her.

Women are direct and liberal minded. They won't cause trouble if they are told an honest story. They appreciate courtesy "more than you'll ever know." Women are basically intelligent. Don't underestimate them. They are usually reasonable, the way they see things. But most significant, women are more loyal. Once made a satisfied customer you'll have her business. She appreciates the fact that you take good care of her. Why dealers neglect to follow up on every sale to cement this loyalty is a mystery, for it is one of the strongest relationships needed for a good business. A good indication of how good a job of merchandising a dealer is doing is found in women's attitude toward that store.

Better service is absolutely necessary. It is suicide to neglect it, she said. The service personnel are not given the training they should get. A serviceman has to be a diplomat as well as a salesman and a mechanic. Why not give them sales training, they could stand a lot. As they call they face an irked woman. The sale usually has to be made all over again before satisfaction is obtained. It is management's fault today when servicemen and salesmen are poor, she said, reflecting in that last observation what women customers feel about a store.

What Price Advertising?—If anyone lacked an appreciation of how much money was being pumped into the local market in advertising and sales promotion, the stunt put on by Taylor Brown, Parmelee Dohrmann Co., advertising committee chairman, F. M. Raymond, San Diego Gas & Electric Co. advertising manager, Roy Dickerson, SDG&E publicity director, and Terrence Driscoll, salesman, Walker's Department Store, was a convincer.

It was done with marbles. Each marble represented $1,000. H. G. Dillin, SDG&E vice-president in charge of sales, had before him a large box filled with bags of marbles, representing the advertising and promotion the utility was willing to spend to build business through the dealers. George Stoltenberg, president of the bureau, had a similar box with bags of marbles representing dealer funds to be spent in advertising. Sam Hall, treasurer, Electric Supplies Distributing Co., had another box of marbles representing funds to be spent by distributors.

A replica of an old farm pump was brought on stage by Raymond and Brown, who explained that it represented "ye olde Bureau sales pump." Salesman Driscoll was asked to represent the 1,500 appliance salesmen in the area and pump up sales. He tried. Nothing came out into the sales bucket. So Raymond sent Dickerson to the utility for some marbles, then the dealer's man, then distributors', and had him pour them in to prime the pump. Then when Driscoll pumped, sales came pouring out into the bucket. The process was repeated for each of the campaigns and promotions on the first six months of 1953 schedule. As the marbles came out, it was explained, they represented much more value, the total being some $25,000,000 in appliance volume for the period.

The number of marbles it took and the number that rattled into the pail were audible and visual proof of the huge quantity of sales promotional money and sales that the combined action of all would invest and produce.

Electricity for Sale—That there is an interdependence between the appliance industry, the serving utility and the mutual customers in keeping the cost of electricity low was shown by H. G. Dillin, SDG&E vice-president. He said that it cost $217 in distribution facilities for each new customer in 1935-39; now $350 per added customer. Only continued sales of appliances to increase use per customer keeps rates low. Growth of population in San Diego has been noted in customer gain per year, taxing company facilities to serve. But he assured that the company's building program and new generating capacity were designed to keep ahead of the demand. "In order to keep this cooperative program in high gear," he promised, "we plan to do our part during 1953 by increas-

It takes lots of marbles to prime a pump

Dan Turner, center, congratulates McCoy and nine other "Yes-But" contest winners

ing the amounts budgeted for advertising appliances, wiring and lighting." The budget is approximately $250,000 with an over-all sales promotional expense of $700,000.

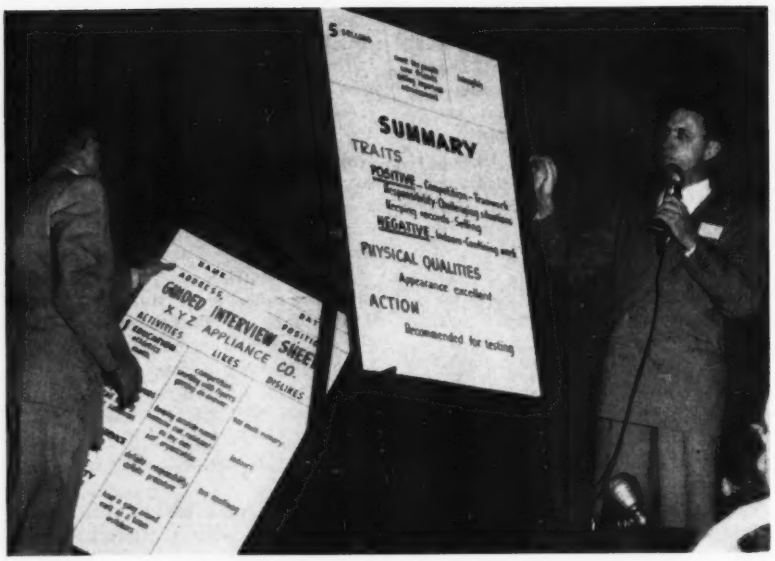
Yes-But Contest — Eleven of the top winners in the recently completed "Yes-But" contest among San Diego salesmen were honored at the beginning of the evening meeting, one of them, Sid McCoy, Parmelee Dohrmann Co., top winner, speaking his thanks for the sales training classes the bureau conducts. In brief the contest was in two parts. First all salesmen were surveyed to find a list of the most difficult and common objections raised by prospects while trying to sell them. These obstacles were sifted for duplicates and a list of 25 of them prepared. This list was then circulated and prizes offered for the best ways to answer each.

Entries were well protected and the judges selected the best with no knowledge of who made the answer. Substantial prizes were given for the best by twenty distributors. The bureau then printed up in pamphlet form the 25 objections and the winning answer for each, giving the salesman's name who made it. These pamphlets were distributed to all at the dinner. (For an illustrated presentation of the ten top ones see *Electrical Merchandising*, March 1953, pp 71-75.)

TV Situation — San Diego's complicated TV situation was clarified to some extent for dealers by Lisle Shoemaker, sales promotion manager of KFMB-TV, which had just changed ownership; and by Al Flanagan, representing the new Channel 6 Mexican station XETV. He gave assurances of quality programs from high grade technical equipment and told reports of fine reception in a surprisingly large area.

Manufacturers' Panel — Always a feature of San Diego Bureau conferences, the panel of manufacturers' representatives gave quick previews of new appliances to come, new promotions or features. Ben Davis, General Electric Co.; Jack Pollon, Amana; Ray Hahn, Maytag West Coast Co.; William Brittle, Sparton; Louis Czsnar, Gaffers & Sattler; Al Lindemann, L&H ranges; Jerry Parshall, Sunbeam, and Fred Fenton, Easy, with his successor, Jack West, made up the panel, which was moderated by J. Clark Chamberlain, bureau manager. Gordon Dawson, conference chairman, Chamberlain and the committee won high praise for an outstanding meeting.

Plans were announced also for the Spring Fair of Modern Home Ideas, April 21-26, at Balboa Park, for which practically all space had been sold.



Dan Turner and Rex Gorton act out an interview with a simple form designed to help any dealer who uses it and logical questions that go with it to answer today's problems...

How Do You Pick Salesmen?

Selecting the real salesmen from the applicants is a dealer's big difficulty. He does not have the time, the facilities, the methods or trained personnel that big companies do to select and test prospective personnel. Yet it takes from $600 to $2,000 investment in a man or woman salesperson to bring them up to producing basis, according to Dan Turner, training coordinator for the Bureau of Home Appliances of San Diego County. "Then does he stay with you?" he asked, as he presented a brief and practical method for the selection of appliance salesmen to the recent winter conference.

Eight different courses are offered to dealers and salesmen by the bureau training committee. Turner proposed that the next thing needed by the dealer was some means to interview and select—perhaps even test—prospective salespeople. This suggestion was met with real appreciation by the dealers because the problem has been a growing one. Hence a program of testing is being developed by Turner and by Rex Gorton, San Diego vocational school distributive education coordinator.

Dealers will do their own interviewing. The testing, which they are not set up for, may be done under bureau auspices in cooperation with the vocational school.

To make the interviewing resultful and keep it on the necessary subjects to bring out the information needed to make an intelligent selection, Turner and Gorton presented in a skit a sample of how it would be done. The basis on which the interview was conducted was written up in a simple three-page outline, given a catchy title "HIT."

To Make a HIT

H stands for obtaining the applicant's *history*—such as his home address, date of birth, schooling, previous jobs, home ownership, dependents, references, etc.

I stands for the *interview* itself. (1) First there is the getting acquainted. (2) Then a description of the job itself. (Many employers, Turner said, do not comprehend or at least fully tell what the job is.) (3) Then in getting the applicant to talk, the interviewer can find out what is needed about his (a) attitude, (b) personal traits, (c) personal adjustment and (d) motivation for the job. (5) It can also be determined what type, either preliminary or advanced, to rate the applicant.

T stands for *testing*, the part of the program still to be worked out. Under this it probably will be possible to get a gage of the applicant's mental ability, personality, sales aptitude, voca-

(Continued on p 130)

ELECTRICAL WEST Sales Guide

News Letter

April 1953

FOR THE ELECTRICAL MERCHANT OF THE WEST

©

The tax deadlines over, dealers began to add inventory and public began to think about buying again, but the auto industry was making a strong play for that consumer's dollar. It is shaping up as a battle of the industries for that dollar. Employment continues high and construction of new homes, all needing new equipment, has been steady. It looks like a good spring and summer, but an awfully busy one to meet the competition.

Spring to life

Advertising in papers and over the air has seen a return of "no money down" offers. One Oakland dealer even offers to rent appliances at low monthly payments applicable on later purchase. There are contests and gimmicks galore. National advertising is spread in all colors over the major magazines. If ballyhoo will sell, there's plenty of it. But one suspects that like the infantry, salesmen have to move in.

Big noise

Spokane is getting over its television splurge and some attention is being paid to white goods. Oddly enough, those dealers who did not go into TV had a good white goods business while the TV fever kept all others bothered. Already a couple of new TV shops, started to ride the crest in, have floundered. Maybe they have just moved to the next TV stop, which seems to be Fresno. Its first station goes on the air May 1, and several new TV stores have opened.

Fever abates

Appliance shows were to be staged in Phoenix and San Diego in April. In Phoenix the Appliance Merchandisers Assn. teamed with a natural, the flower show, to stage its Spring Appliance and Air Conditioning Show at the state fair grounds, April 9-12. . . In San Diego it is the annual Spring Fair of Modern Home Ideas put on by the Bureau of Home Appliances of San Diego County at Balboa Park. Again one building is to be devoted to home wiring and lighting exhibits. . . Instead of staging a show of its own, the Los Angeles Electric League will join the Los Angeles Home Show, June 4-14, back in Pan Pacific Auditorium, and make it as electrical appliance as possible. ... In San Francisco, the Northern California Electrical Bureau is laying its plans to revive its Electrical Wonderland a year from now, in April.

Spring shows

Seattle City Light renews its $55 electric range and water heater installation offer. It will be handled through appliance dealers and plumbers. Customers not now using electric cooking and water heating who replace with a full-size range and a 50-gal or larger water tank are allowed the $55 toward the wiring cost. Where an old side-arm water heater is replaced a $25 allowance is made.

Wiring allowance

Another show

Sacramento also will have a 1953 Electrical Home Show, May 21-24, at Memorial Auditorium, under sponsorship of the Sacramento Valley League. Last year's show had a 7,000 attendance in three days; 10,000 are expected this year. . . The league is also running a spring electric range contest among consumers, during which 12 top-line ranges have been donated by manufacturers and distributors as major prizes. Housewares also are offered. Customers must obtain entry blanks and information from dealers' stores and answer in 25 words "Why I Want an Electric Range."

Summer too

Show dates for the summer are being announced. Western Summer Market at Western Merchandise Mart, San Francisco, July 19-22. At the same time Western Lamp & Picture Show at the Whitcomb Hotel, followed by Western Glass, China, Gift, Jewelry, Toy, etc., show Aug. 2-5. Portland Gift & Houseware Show Aug. 9-12 at Public Auditorium. Seattle, Pacific Northwest Show, Terminal Sales Bldg., Aug. 16-19. Spokane Gift Show, Aug. 23-25.

Fees now

Dealers of the State of California have been alerted by Electric League of Los Angeles over Assembly Bill 2639, introduced in the California Legislature to impose registration and license fee on every television service dealer, technician and installation man. League maintains it would deplete technicians' ranks, be discriminatory, require too much supervision, increase cost of service without benefit to industry or public. . . The league reports TV saturation of 1,490,829 or 77% as of March 1.

May tie-in

Water systems sold by a dealer can ring up six times their value in sales of bathroom, kitchen, laundry and home heating equipment requiring water, it is pointed out as National Water Systems is set for May. In rural areas water systems are profitable business and tie-ins with the national campaign of the Plumbing & Heating Industries Bureau bring results.

Woman's work

Julia Kiene, manager home economics institute, Westinghouse, was the principle speaker for the last session of the California Home Economics Assn. at the Palace Hotel, San Francisco, March 28-30. The convention also had outstanding displays of appliances by Apex, California Electric Supply, Frigidaire, G-E Supply, W. J. Lancaster, Leo J. Meyberg, Necchi, John Oster, Pioneer Appliance, Rheem Mfg., D. E. Sanford, Westinghouse Electric Supply. Marguerite Fenner, PG and E home economics director, was general chairman.

Fair Trade

On the Fair Trade front, a number of actions took place. In San Francisco Judge Wollenberg ordered a permanent injunction against Grayson-Robinson stores from selling Westinghouse small appliances below fair trade prices. Before California Legislature is A.B. 2299, amending the Fair Trade Act to provide that the owner of a brand name who fair-trades must bring enforcement action within 15 days. In New Mexico a bill to repeal the Fair Trade Act died in committee. In Oregon a lower court held an injunction could not be obtained for goods acquired before passage of the McGuire Act. In Utah the Attorney-General ruled that Fair Trade Acts be enforced against any violator operating in Utah whether in interstate commerce or not. . . The Sunbeam vs MacMillan decision is being misinterpreted as respects the New Jersey law. The decision only covered goods obtained before passage of the McGuire Act. . FCC Examiner Frank Hier ruled that fair-trade contracts between a manufacturer who also has retail outlets are not prohibited where the retailers do not compete with each other and the retailing operation is incidental to a different major endeavor.

Westclox announced a broad program of wholesale and retail fair-trade contracts in all states having legislation. — More Fair Trade

All price controls on appliances ended and so far few price increases have been noted. All makes of electric lamps, both incandescent and fluorescent, took a slight increase. General Electric, however, reduced retail prices on automatic blankets. — Controls off

In Hawaii the Electrical Living committee of Pacific Coast Electrical Assn., Hawaiian Section, has announced a second quarter business building program for 1953 based on electric range and water heater sales. Beginning April 1, Hawaiian Electric Co. Ltd. has agreed to contribute toward wiring costs. Contractors will get $50 allowance on electric range and $20 on water heater installations, but to make the wiring absolutely free appliance distributors and dealers must accept all wiring costs above these allowances. One-third of this additional cost is borne by the distributor, two-thirds the dealer. Rules are printed and distributed through George A. Rinker, chairman of the committee. — Program for '53

General Electric, with the cooperation of utility companies, plans a nation-wide survey to find the fluctuation in home electric power consumption over a 24-hour period. Clarence H. Linder, G-E vice-president of the Major Appliance Division, proposed it at Edison Electric Institute sales meeting. An engineering firm would be engaged to carry on the research, which would benefit the entire industry in effective load planning effort. — Plan for power

To satisfy "Young Moderns," Lightolier Inc. has a group of handsome lighting fixture ensembles designed for modern-type homes, using a pure geometric form of washable white Plexiweave in a frame of jet wrought iron. Fixtures diffuse the light and provide soft general illumination. — Modern living

James L. Schricker, retired district appliance sales manager of G-E Supply Co., Salt Lake City, has been named managing director of the Intermountain Electrical Assn., to fill the vacancy left by death of Ray L. Halverson. He has had long experience in the appliance industry in Utah, Idaho, Wyoming and Nevada. — New director

Distributor news: Theo. H. Davies & Co. Ltd. has been made distributor in the Hawaiian Islands for Crosley. Former distributor was Coleman Co. Victor Mountain, v-p and s-m with Coleman, joins the Davies organization to head up the appliance division. . . Horn & Cox Inc., Los Angeles, has become Chrysler Airtemp and Pacific Mercury TV distributor in the area. . . Majestic Radio & Television is a new firm established to distribute Majestic TV and other lines in the Los Angeles area. . . Hollywood broilers and fryers and Naxon portable washers are now represented in Los Angeles by W. T. Powell, 5225 Wilshire Blvd. Marcus Gaylin of Gaylin Distributors is named southern California distributor for Roto-Broil, with headquarters at 1018 S. Hill. . . F. B. Connelly Co. of Oregon, in taking over the Sylvania distributorship in the Northwest, has completely remodeled its display salon and held open house last month for dealers. A huge roof sign dominates the area. . . Pacific Coast Heating & Appliance Co., Main St., Seattle, and with a regional office in Spokane at W. 1205 W. College, is now distributor for CBS-Columbia television in Washington. Paul Trumbull, assistant general manager, is in charge of the TV sales in Seattle, Lawrence Landry in Spokane. . . Fairmont Distributing Co., 3879 43rd St., San Diego, has been organized to represent Clear Beam antennas in the San Diego area. A. C. Dittbrenner is president, Floyd Umbarger is vice-president and general manager. — Names in the news

M. D. "Bud" Schuster, who has been general sales manager of Hoffman Sales Corp., has joined McCormack & Co., distributor for Hoffman, Leonard appliances and ABC laundry equipment, as vice-president and director of the San Francisco firm. Before Hoffman, he was general manager at Ray Thomas Co., Los Angeles. He succeeds Al Lindholm, who recently retired due to illness.

Distributor changes

Kaye-Halbert TV has appointed Phil Rudden as district representative for northern California. Rudden was formerly with San Jose TV Supply and more recently Fresno TV Supply. He is now in a branch operation for Oakland and San Francisco with headquarters at 219 9th St., San Francisco. . . Also announced was appointment of Capital Electronics & TV Supply Co. as distributor in Sacramento, 1714 10th St. In Phoenix Minthorne Music Co, Inc., 611 W. Washington, Seeburg Phonograph distributor, was appointed.

... and moves

General Electric Credit Corp.'s vice-president and Western regional manager, L. E. Scott, announced the formation of a new district in Seattle with Elmer G. Foster as its manager. He has been manager of the Seattle office since 1948. Also announced was the opening of a branch office in Long Beach with T. A. McIntosh as manager. It is located in the Stafford Bldg., 218 E. 1st St.

New district

G-E Supply has just opened a new warehouse and office in Long Beach and announcement was made early in the month that a new building would also be built in San Diego.

... and quarters

More names in the news: Gerald "Jerry" Fitz Gerald has taken E. R. Vander Linden's place as general sales manager at Kelvinator in Oakland. . . Burt Lau, who has been buyer of appliances at Sloan's, San Francisco, is now with the Gregnall Co., distributors of Natalie Kalmus TV in San Francisco.

People change

Hugh Cate has taken Floyd Lovelace's position with the Department of Water & Power as Lovelace has stepped into the managership of residential sales. Cate will supervise sales to mass housing and cover all new construction sales, and spend much time in the trade.

and advance

Thor Corp., in buying the Leeson Steel Products with its Presteline electric range, enters the range and refrigerator business along with its washing machines, freezers, ironers, etc. It will feature the built-in style of electric range brought out recently by Presteline.

New field

Edwin D. Wolf of Denver has been named factory representative for Landers, Frary & Clark on housewares and specialties. . . Herbert Steinkamp of Seattle is now the Republic Steel Kitchens district sales representative, to establish distributorships in Washington, Oregon, California and Idaho, most of Nevada, some of Montana, British Columbia and Alberta. . . C. A. Stockhoff has been appointed by Servel as its Southwestern public utility manager to account executives in Wyoming, Colorado, New Mexico and some other states. . . Gough Industries Inc. of Los Angeles has opened a branch appliance distributorship in Fresno at 840 Blackstone Ave., with Henry Oland as manager. . . Ralph Slonacker, district salesman for Crosley in Portland, now supervises television sales. . . Freezer Queen Products Co., makers of packaging for frozen products, has appointed Brackett & Bischoff of Berkeley and Richard Moore of Los Angeles as factory representatives.

Reps

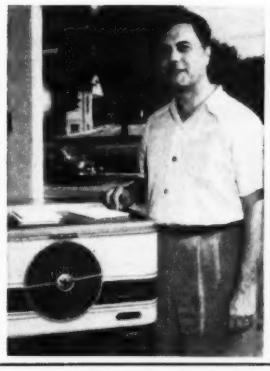
Edward G. Marten has been named vice-president and administrative assistant to Al H. Meyer, president of Leo J. Meyberg Co., San Francisco.

V-P

"Spent $40 on ads. Got $15,000 results !"

"Phone calls started immediately after the first Fedders dealer newspaper ad ran," says Lou Nachman, Nachman & Co., St. Louis, Mo. "Ninety per cent of the people we contacted bought Fedders units. We sold 50 units from 3 ads which cost us exactly $40. You bet I'm tying in for the whole 1953 program."

"We couldn't have afforded to run ads like these !"



"The Fedders dealer newspaper ads with our store name in them brought excellent sales results," says Leonard J. Fleck, Fleck's Appliance Center, St. Louis. "We couldn't have afforded to run any ads like these dealer ads even in our neighborhood papers. Fedders knows the secrets of retail advertising, all right."

"Sold 40 to 50 units from 3 newspaper ads !"

"1952 was our first year in the room air conditioning business," says F. W. Greissinger and C. E. Greissinger, Variety Vacuum, Harrisburg, Pa. "We got into it because Ott Distributors had the Fedders dealer newspaper advertising program. We felt it would help us sell. We sold 40 to 50 Fedders units from 3 ads. Just think what we'll do next year now that we know how!"

"Couldn't afford to advertise any other way !"

"We sold six Fedders Room Air Conditioners from one ad," says Bob Heimer, Bob's Cabinet Shop, St. Louis. "Sorry I didn't go along in the very beginning, but I sure am going to tie in 100% in 1953. We could not afford to advertise in any other way. Even if we could, I'd stick to Fedders dealer advertising program."

How did we sell so many Fedders Room Air Conditioners ?

HOW did these Fedders dealers clean up? It's simple. They helped Fedders test a dealer newspaper advertising plan in 3 markets last year. The way those ads brought in customers and relieved them of thousands of dollars, you'd think there was some kind of hypnotism involved. But let's be modest and just say that Fedders knows the secret of retail advertising. Here's what this dealer newspaper program gives you:

1. The biggest, most concentrated barrage of newspaper ads ever run during the selling season.

2. Lower cost per ad.

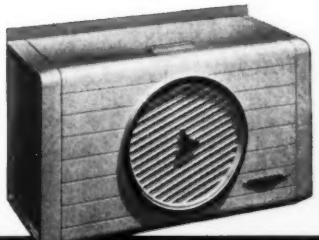
3. Split-second timing...on the hottest days in the heart of the selling season.

4. Your name in BIG PRINT in your own market.

5. Better tie-in with Fedders national advertising.

6. Greater Fedders dealer identification.

You'll sell more and profit more if you tie in. See your Fedders distributor right away and get full details on the complete 1953 Fedders merchandising package. Or write to Fedders-Quigan Corp., Dept. EW-3, Buffalo 7, New York.



UNITED WE SELL FEDDERS

How Do You Pick Salesmen?

Starts on Page 124

tional interest, mechanical ability, etc.

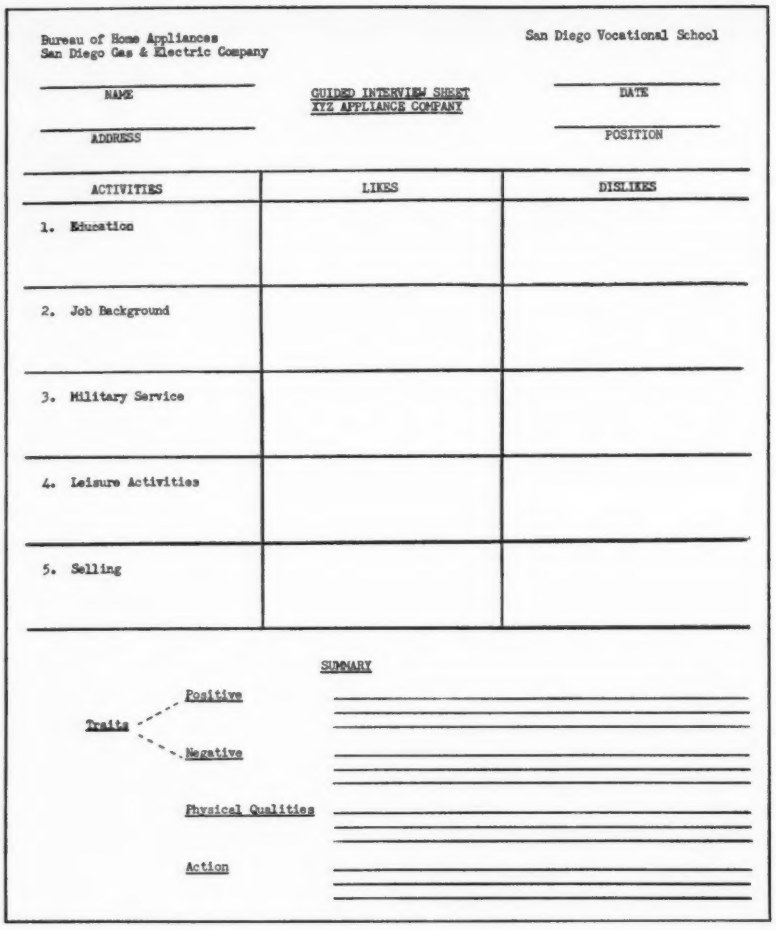
To aid in making the interview, the chart shown here is used by the dealer. As he and the applicant talk he can mark down, in symbols if he likes, or in a single key word, his ratings on the points listed.

The method of asking the applicant what he liked in school, what he disliked and why; the same in his previous jobs, military service, his leisure activities and about selling, gives important clues in judging the person's interests and shortcomings.

For something to measure by, there is a Job Analysis Personal Requirements sheet for outside salesmen of appliances that sets down the necessary traits or attitudes, with a brief sentence describing each. The list is as follows:

1. **Dependability**
   - (a) Stands on his own feet and pulls his own weight
   - (b) Prompt in keeping records
   - (c) Accurate in quoting prices and and writing orders
   - (d) Respected by competitors
2. **Loyalty**
   - (a) Makes it a point to follow instructions faithfully
   - (b) Loyal to the profession (Salesmen are not peddlers)
   - (c) Follows store policies
   - (d) Takes criticism as it is meant
3. **Team Work**
   - (a) Ability to get along with others
   - (b) Makes it a point to keep, and make, as many friends as possible
   - (c) Works well with credit department
4. **Initiative**
   - (a) Is a self-starter and does not need prodding to get off ground
   - (b) Ability to succeed in getting interviews with difficult people
   - (c) Gets the facts needed to make the sale before calling
5. **Physical Qualities**
   - (a) Energy
   - (b) Neat appearance
   - (c) Poise and self-confidence
   - (d) Stature and bearing
   - (e) Pleasant voice
   - (f) Correct speech

Since a large proportion of hiring of salesmen is done simply by interview it is important, Turner points out, that all necessary information be obtained in an orderly way in that interview. The form suggested need not be adhered to exactly so long as during the interview most or all of the information is touched upon. The form shown here was particularly designed to be of help to owners of small stores.



Bureau of Home Appliances
San Diego Gas & Electric Company

San Diego Vocational School

NAME _____ DATE _____

GUIDED INTERVIEW SHEET
XYZ APPLIANCE COMPANY

ADDRESS _____ POSITION _____

ACTIVITIES	LIKES	DISLIKES
1. Education		
2. Job Background		
3. Military Service		
4. Leisure Activities		
5. Selling		

SUMMARY

Traits — Positive _____
Negative _____
Physical Qualities _____
Action _____

Any dealer can type up an interview sheet like this to record his estimate of a man

After selection, depending on how advanced the applicant is in selling, the bureau makes available its eight different courses. These start with (1) the ABC's of Selling, a fundamental course. Next comes (2) Major Appliance Selling. This has special reference to big ticket items, with one traffic appliance session. (3) Sales Psychology is another course offered. For the store owners and sales managers only is a course on (4) Successful Management of an Appliance Business. (5) Effective Sales Speech is another useful training course for all. (6) Television Sales course is designed specifically for TV sales, service and repair people. (7) Selling Against Resistance was introduced last year to fit new conditions in the field. And the latest addition was a course (8) Selling Electric Housewares.

Since the courses started 1,885 have been graduated. In 1946 there were 75. In 1951, 462. Last year there were 430. One of the interesting and valuable outgrowths of this training program was the recent "Yes-But" contest, which brought forth from the salesmen themselves the 25 most commonly raised objections customers make and then prizes were awarded for the best ways to meet each of these objections. Copies of the results are obtainable from the Bureau of Home Appliances in San Diego.

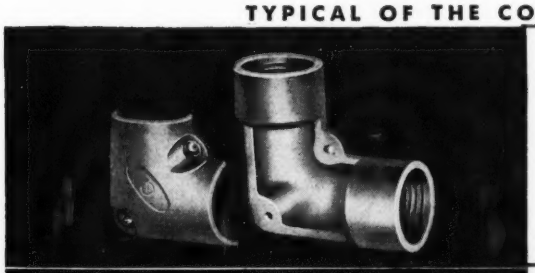
As in the case of the Yes-But contest, it was the one who had taken the courses who fared best in the prize winning, so, Turner contends, it will be found that those who score highest in the selection tests the bureau is planning to make available will also prove best in selling and in stability.

FOR CORNER PULL-IN ELBOWS, 3-PIECE CONDUIT COUPLINGS, PIPE STRAPS—CLAMP BACKS—NEST BACKS

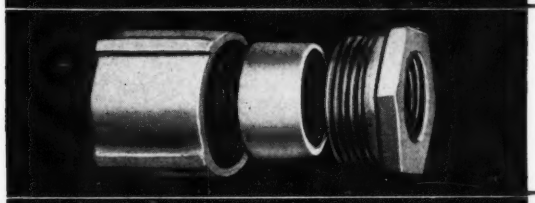
GEDNEY *ALWAYS!*

NATURALLY you want to cut installation time and costs. And you'll do it easily with Gedney Fittings, for these fittings are accurately machined and threaded, smooth finished, individually inspected to ensure top quality. What's more, Gedney Fittings are made of unbreakable malleable iron. For best profits, order Gedney always!

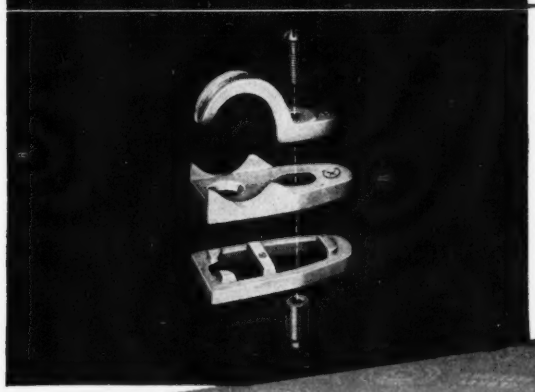
TYPICAL OF THE COMPLETE GEDNEY LINE ARE:



Corner Pull-In Elbows in ½", ¾" and 1" sizes. Ideal for space-saving, machine wiring, easy wire pulling. Cadmium plated.



3-Piece Conduit Couplings in a large range of sizes from ½" to 6". Cadmium plated.



One-Hole Pipe Straps, Clamp Backs, and the handy new Gedney Nest Backs. These supplementary spacers nest firmly behind the Clamp Backs — use as many as you need to hold pipe at desired distance from wall. Hot dip galvanized to prevent corrosion.

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

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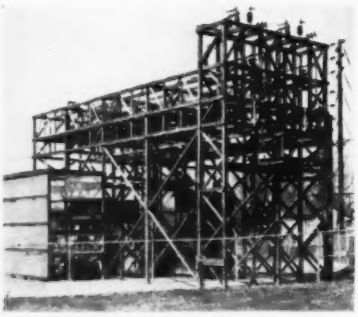
Foundry, Factory and Shipping Point: Terryville, Conn.

FIELD PERFORMANCE RECORDS



ENGINEERING NOTES...

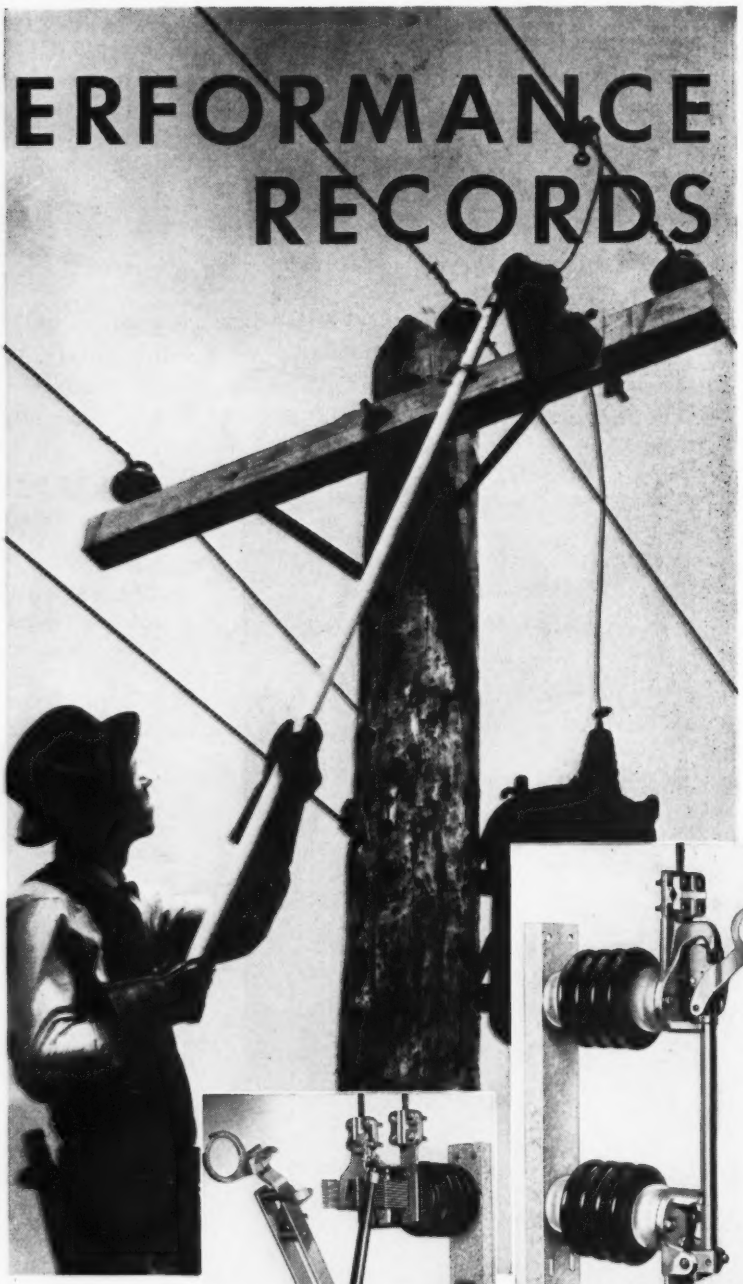
Electronic Switch Triggers Tests At Kearney Substation Laboratory

POWER follow current is initiated in lightning arresters and fuse cutouts by an electronic circuit at our test substation. Designed and built by Kearney engineers this switch enables them to start follow current at any desired point on the line voltage wave within the range of 10° to 170° positive or negative. Repeated shots on specified points of the wave provide exacting tests of equipment operation.

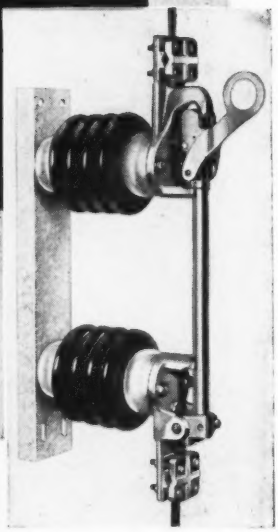
Oversimplified, the circuit consists of a pulse activated Thyratron which fires a surge generator automatically. An R-C circuit selects the proper phase relationship with the substation supply voltage and feeds a limiter stage. The square wave output of this amplifier is then differentiated into pips. These steep pulses are impressed on the normally negative grid of the Thyratron. A manually operated relay removes the negative cut-off voltage from the grid and the tube fires on the first positive pulse occurring thereafter, triggering the surge generator and starting the follow current.

When you specify Kearney Products you are getting the best equipment that exhaustive research, design study and test can produce for the power field.

-208



By pass voltage regulators safely and economically with this Kearney Regulator By-Pass Switch. Replaces three single pole hook operated switches formerly required for the job.



High conductivity current path through the Kearney Ultra High Pressure Disconnect Switch reduces operating temperature, cuts replacement costs.

KEARNEY

Prove the Value of KEARNEY PRODUCTS

POSITIVE Performance; Sturdy Construction; Long, Hard Service . . . these are the reasons why operating men prefer Kearney Equipment.

Protective equipment especially demands positive performance. The cutouts and oil switches shown on these pages have been engineered and field-tested for full range interrupting capacity. That's why they are standard with most of America's power companies.

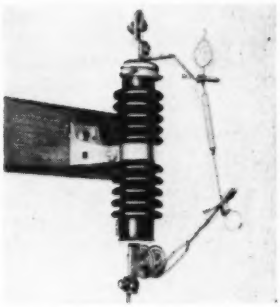
Sturdy construction saves maintenance trips, increases profits for hundreds of operating utilities in thousands of locations. You can count on long, hard service from Kearney Equipment in all types of climates; in all types of atmospheres.

Write for complete technical information on these products. Compare feature for feature, value for value. See for yourself why more and more men in the field are specifying "All Kearney" on their orders.

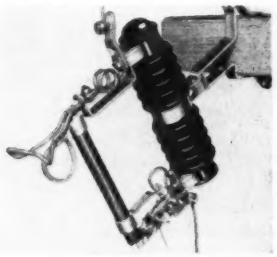
JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVE. • ST. LOUIS 10, MO.
MAYDWELL & HARTZELL, *INCORPORATED*
WEST COAST DISTRIBUTORS
Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix
Canadian Plant, Guelph, Ontario

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

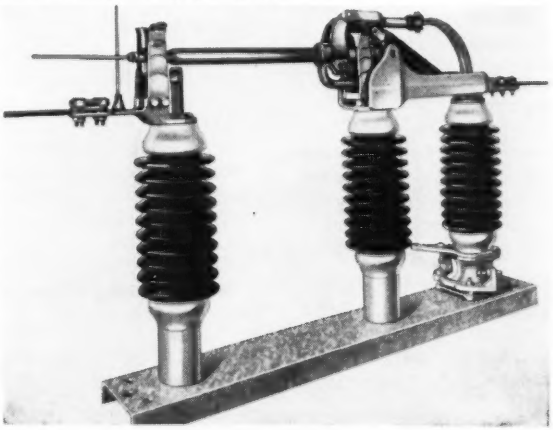
"The Mark of Quality Products"



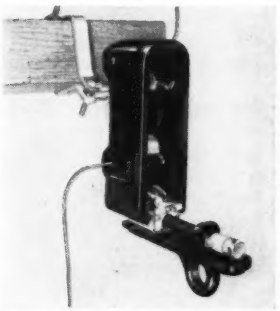
The Trip-O-Link, a Kearney invention has given 100% full load protection to rural lines for over 15 years.



Trip Outs provide reliable heavy-duty protection at sustained maximum load ratings without damage to cutout.



Kearney Group Operated Switches are made fully adjustable to compensate for shifts in mounting structure or play in interphase rod travel. Fully adjustable design adds years to normal switch life; cuts replacement cost. Beryllium copper spring contacts provide high pressure current transfer at both ends of blade for cooler operation. Oilite bearings align blades with contacts and allow full wiping action. Dependable, all-weather operating mechanism works smoothly whenever routine or trouble requires quick action.



The Trip-O-Matic guards expensive distribution equipment; provides full protection for systems subject to widely varying city fault conditions.

PRODUCTS *for Better Construction Safer Maintenance*

THE MONTH IN BRIEF

IBEW Strikes Against Power Companies

Strikes by AFL's IBEW local 47 against Southern California Edison Co. and California Electric Power Co., which began March 10, showed no signs of a break as this issue went to press. Details on p 138.

Negotiations Under Way at Seattle

The Joint Crafts Council, representing 21 unions with members employed by Seattle City Light, has agreed to a plan under which each council will name a committee of three to negotiate settlement of a long-pending dispute over City Light wages and working conditions. Accepted by the city council, the plan was proposed by the Seattle Central Labor Council.

WWP Directors Approve Merger

Washington Water Power's board of directors approved the basic terms of a merger agreement with Puget Sound Power & Light Co. drawn up by managements of the two companies. Puget Power President Frank McLaughlin said that the terms would be submitted to his company directors at an early date. PUDs announced that, in event of a merger, they would press piecemeal condemnation of Puget Power properties. To this WWP President Kinsey Robinson replied that he had no fear that the districts could successfully condemn any of the properties. He further pointed to the savings under the merger plan, which will cost WWP $91,000,000 as compared with the $107,000,000 bond issue that the PUDs plan to float to acquire less property. (The PUD deal does not include the Whatcom County system and the Diamond Ice and Cold Storage Co.) Seattle investment houses regard the merger as better for the stockholders but will not commit themselves on the likelihood of its going through. Heavy buying of both stocks, with price increases, followed the merger talk.

Strengthened Power Commission Okayed

A bill to establish a five-member state power commission with powers to build or buy electrical generating and transmission facilities was passed by the Washington Legislature and signed by Governor Arthur B. Langlie, who had requested it. Private and public power proponents supported the bill.

PGE-Sponsored Bill Still Has Chance

Defeated in an initial house vote of its proposed amendments to the state hydroelectric code, Portland General Electric Co. offered to amend the bill so that it would call specifically for fish ladders or other conservation features to be provided by builders of any hydroelectric dams. Thereupon a call to reconsider won 39 to 18 in contrast to the vote to reject of 31 to 28 given the day before. Among other things the bill provides for an appeal from commission rulings; authorizes any state agency, if it desires, to sell to a licensee at fair market value any state-owned property necessary for the project; provides that the rights of a licensee to the water involved shall be subordinate to all existing and future water rights for industrial, domestic, municipal, stock and irrigation purposes.

Strengthened BPA Powers Urged

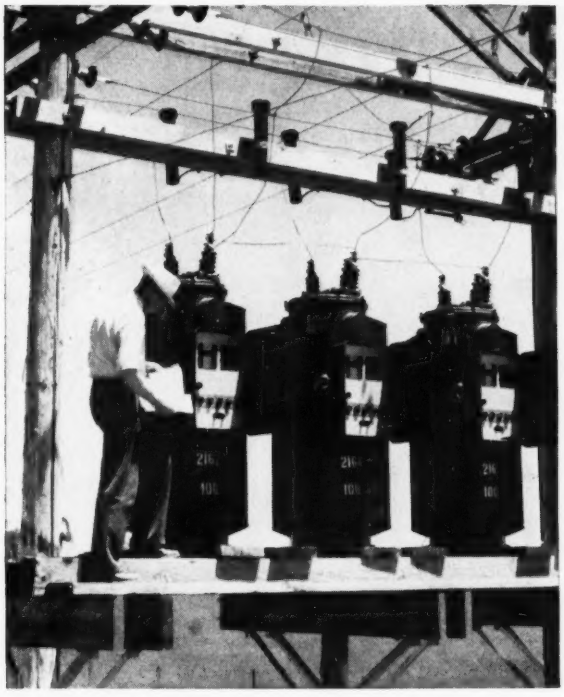
On grounds that time would not permit a state or regional agency (EWEST, January, p 120) to construct projects necessary to avoid an anticipated 1959-60 power shortage in the Pacific Northwest, the Northwest area section of the Bonneville Advisory Council voted in Seattle March 9 to seek enlargement of present powers held by BPA. These powers would include permission to issue revenue bonds, to purchase power and to construct steam or other fuel-fired plants. In suggesting that congress give BPA a new role, the committee defined the term as "a responsibility to serve all who rightfully request service with adequate facilities at reasonable rates and without discrimination. This applies equally to private utilities, to public agencies or to the Bonneville Power Administration." Private power companies will get the next 500,000 kw of power generated by federal plants, according to Paul J. Raver, Bonneville administrator. Eleven federal and three nonfederal dams under construction will add 2,000,000 kw of prime power to the Northwest pool within five years and satisfy minimum requirements through 1957-58, according to BPA estimates.

BPA Gives Steam Peaking Notice

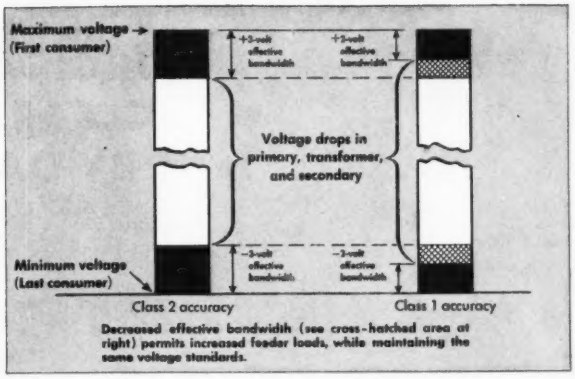
Bonneville Power Administration gave its interruptible power customers two days' notice that, starting April 1, steam-generated power would have to be picked up to carry peaking hour needs. Steam peaking is necessary four to five hours a day, five to six days a week. From 5 to 8% of the 400,000-kw interruptible load (mostly going to aluminum production) is affected by the deficiency. As a result of dry weather in February and March, stream flows are low and reservoirs are being drawn down (as much as 5 ft daily at Coulee) to meet average loads. April normally is a month of radical change in stream flow, with initial spring runoff high. This year lower elevation snowpack in the Columbia basin is below normal.

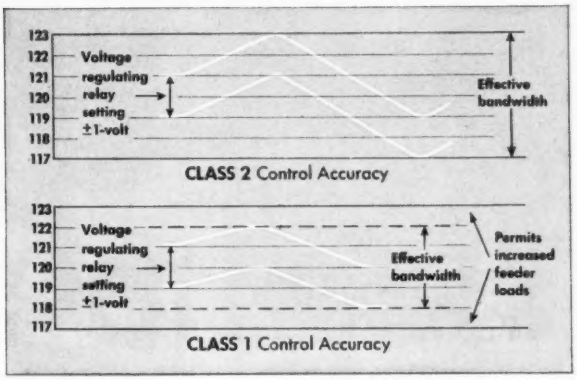
CVP Pricing Policies Criticized

Sharp criticism of USBR's power pricing policies for the Central Valley Project was heard at a three-day hearing of the California Legislature's senate-assembly water problems committee in San Francisco. Some witnesses were afraid that the bureau had set CVP power rates so low as to jeopardize financial feasibility and hamstring construction of future water works. Others feared that long-term, low-priced power sale contracts have "scuttled" prospects of state purchase of the project. Irrigation interests accused the bureau of setting up its repayment schedule to favor power customers at the expense of water users.



GENERAL ELECTRIC TYPE ML32 voltage regulators provide better regulation on this branch line.


Maximum voltage
(First consumer)
+3-volt effective bandwidth
+3-volt effective bandwidth
Voltage drops in primary, transformer, and secondary
Minimum voltage
(Last consumer)
−3-volt effective bandwidth
−3-volt effective bandwidth
Class 2 accuracy
Class 1 accuracy
Decreased effective bandwidth (see cross-hatched area at right) permits increased feeder loads, while maintaining the same voltage standards.



Smaller effective bandwidth of voltage regulators permits increased feeder load-carrying ability

Class 1 accuracy controls of all G-E liquid-immersed feeder voltage regulators are important factor in reducing effective bandwidth

Voltage limits actually held at the output terminals of a feeder voltage regulator are referred to as effective bandwidth. One reason the effective bandwidth may exceed the bandwidth setting of the voltage regulating relay is the effect of control accuracy. Changes in temperature and frequency and errors in the potential transformer, current supply, or line-drop compensator elements act to increase the effective bandwidth of a regulator above the relay setting.

Hence, control accuracy is the key to reducing the effective bandwidth and, thus, increasing the load-carrying ability of a feeder.

The diagrams show how a reduction in effective bandwidth permits either lengthening a feeder to pick up more load or increasing the load over the existing line, while maintaining the same voltage standards for first and last consumers.

All G-E regulators, feeder- and station-type, are furnished with Class 1 accuracy controls as standard. Reducing effective bandwidth is important to you because of the obvious advantages of increased loadings or longer feeders. For full details on what Class 1 control accuracy of G-E regulators can mean to your system, contact your nearest G-E sales office, agent or distributor, or write for bulletin GEA-5690 to General Electric Company, Section 423-3, Schenectady 5, New York.

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

You can put your confidence in—

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Overhanging branches removed and trees shaped properly for Utility in Beverly Hills

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

DAVEY LINE CLEARING
DIVISION OF
DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA
Russ Bldg., San Francisco, SUtter 1-3377
Story Bldg., Los Angeles, TUcker 1929

EXTRA Holding Power QUICKLY Installed TOUGH For long life

EVERSTICK ANCHORS

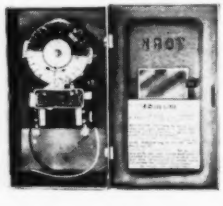
For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

It follows the sun . . .

TORK ASTRONOMICAL CONTROL
DIAL now is ready, as a kit, to fit any regular model on the job. Simple to change. Saves time — Saves money **Use the best.**
PLAY SAFE

ON AT SUNSET —
OFF AT SUNRISE or a fixed time, 10:30 p.m. to 1:30 a.m.
Tork Time Switches require no attention — this feature $12.00 A must on all public safety lighting. An economy on all commercial lighting. **Tork** is fully automatic. No one forgets.



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See your jobber

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Los Angeles, San Francisco, Seattle
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THIS MONTH'S NEWS

Surcharges To Be Reviewed In Public Hearing

Oregon's PUC has granted consumers who questioned legality of surcharges by three private utilities covering abnormal steam generating costs (EWest, March, p 118) permission to review the question in public hearing.

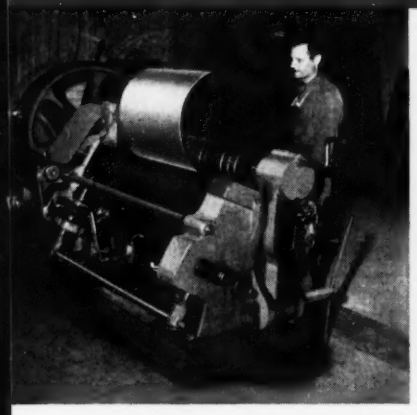
PUC Commissioner Charles Heltzel on March 26 gave complainants authority to amend the initial complaint against Portland General Electric Co. to include Mountain States Power and Pacific Power & Light companies. However he refused the request of Monroe Sweetland and his wife, PGE customers, to have the PUC investigate the surcharges on PUC motion, denied a request that the utilities be compelled to carry burden of proof in defense of the surcharges and refused to name a disinterested attorney as "electrical consumers' counsel" at public expense.

The Sweetlands were given five days to amend their initial complaint to include the other utilities and, although the three companies legally have 20 days in which to reply, Heltzel expressed a hope that the hearing might be opened earlier to complete the session before the Oregon Legislature adjourns in mid-April. Representative Sweetland's bill requiring public hearings before assessment of any future emergency surcharges is pending in the state senate, having passed the house.

In denying Sweetland's motion that the state regulatory commission take over the attack on surcharges, Heltzel said that an investigation of the surcharge had been conducted by the commission and had failed to satisfy the body that sufficient grounds exist to warrant a hearing being ordered under the commission's own motion. He referred to 1951 hearings when a dry summer threatened to force abnormal steam generating.

● **A visual program** outlining the latest electric power distribution practices for industrial plants has been announced by General Electric Co. as the latest in its More Power to America series. It consists of a 35-mm sound color slidefilm, a 38-page power distribution manual and allied literature with additional product information.

This is how *Kuhlman* makes distribution transformer tanks

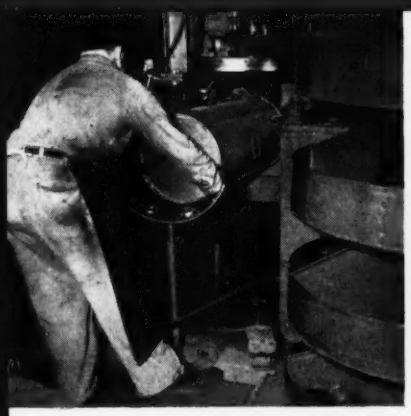


1. All Kuhlman transformer tanks are made of heavy gauge copper bearing steel. Here a tank begins to take shape. The steel has been measured and cut and the necessary openings made. It is now being rolled into the shape of a cylinder.

2. After the metal has been shaped, the edges are brought together and electrically welded to form an oil tight seam.

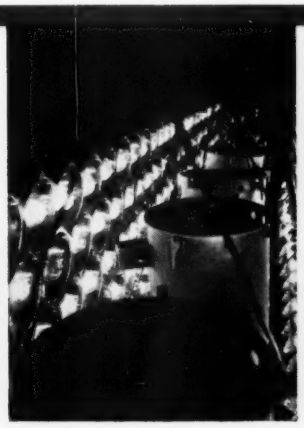
3. Next, the top end is "rolled down" to a smooth lip to form a suitable gasket seat.

4. The next step is to attach the bottom. This is first "spotted" and then electrically welded all the way around to form an oil tight seal.

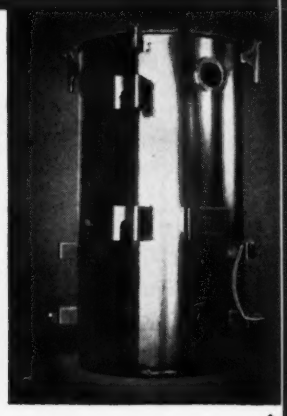


5. After the bottom end has been "rolled down" to form a smooth lip, the necessary accessories such as lifting ears, nameplate bracket, and mounting brackets are spot welded onto the tank as shown above.

6. Before they are painted the tanks are chemically cleaned and then shot blasted to assure a clean painting surface. Each tank receives a coat of rust inhibiting primer and two coats of corrosion resistant paint.



7. After each coat of paint the tanks are "baked" with infrared lights to insure a more durable finish.



8. And here is a completed tank, ready to receive its core and coil assembly and all necessary connections. Surfaces of Kuhlman tanks have successfully withstood 500 hours of salt spray and weatherometer tests.

Kuhlman transformers have been "on the line" for over half a century. Many of the earliest Kuhlman transformers are still in service—proof that Kuhlman builds rugged, highly efficient transformers. Specify Kuhlman. For more details about distribution transformers, ask for Bulletins CS-201 and CS-202.

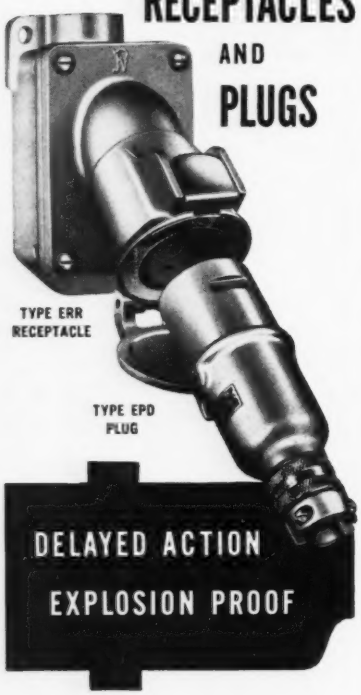
Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN
CRYSTAL SPRINGS, MISSISSIPPI

KUHLMAN K E ELECTRIC

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,*
15th Floor, 50 Church Street, New York 7, New York. Cable address: Microphone, New York.

PYLE-NATIONAL

RECEPTACLES AND PLUGS



...are safe, reliable connectors for portable electrical equipment in hazardous locations, (Class I, groups C and D) and also are safe and positive current rupturing devices.

The delayed action lock, which is extremely easy and simple to operate, makes it impossible to open or close the circuit except when the contacts are safely confined within the explosion-proof chamber. Pressing a conveniently-located button is all that is necessary to release the delayed action lock. The plug is inserted and withdrawn in a straight line. No turning is necessary. No separate sealing fittings are required. For 15 and 30 ampere, 2-wire, 3-pole and 3-wire, 4-pole circuits.

Sold nationally through electrical distributors. Write for detailed literature.

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1364 NORTH KOSTNER AVENUE
CHICAGO 51, ILLINOIS
CONDUIT FITTINGS • FLOODLIGHTS

COURT RESTRAINING ORDER ISSUED IN IBEW STRIKE

AFL's IBEW local 47 struck against California Edison Co. on March 10 and later that same day called a walkout on California Electric Power Co. At issue in the Edison strike are union shop and wage increases (union wants 25c an hour; Edison offers 5% or $15 a month, whichever is higher). California Electric Power has a union shop but the same wage demands are being made, with the same offer.

Supervisory and other nonstriking employees have maintained service but strikers have been accused of numerous acts of sabotage by the Edison company. Major one was the dynamiting of five 220-kv transmission towers on lines from Big Creek and Hoover Dam. The company is offering a $25,000 reward for information leading to arrest and conviction of the dynamiters; union spokesmen deny all responsibility for property destruction and the local is offering a $5,000 reward for information on the dynamiting.

Late in March, Judge Frank C. Swain, Los Angeles County Superior Court, issued a restraining order requiring Edison pickets to keep 20 ft apart except when passing, refrain from threatening or intimidating employees, give right-of-way to persons and vehicles entering or leaving company premises. At a hearing scheduled for April 6 the union was to show cause why preliminary injunction against these practices should not be issued.

Earlier Edison had filed in Superior Court for $750,000 for actual damages with an additional award of $50,000 daily and $500,000 in punitive damages plus $25,000 daily as long as the strike continues. It named several International and local IBEW officials along with John Does and John Doe Assns. It charged the defendants with interferring with access to its facilities and mass picketing, with threats against nonstriking employees and with destruction of company property.

There have been no company-union negotiations since the strike began, although both sides have had separate but unfruitful meetings with federal mediators. The union has proposed resumption of bargaining or submission to a fact-finding board. Edison contends that collective bargaining cannot be conducted under coercion. IBEW officials have threatened to invoke Taft-Hartley and are preparing charges to present before NLRB.

Edison newspaper ads have invited striking employees back to work; have told its objections to the union shop, its position in the wage dispute; have offered rewards for information leading to arrest and conviction of persons trespassing or sabotaging.

Edison President W. C. Mullendore has emphasized that the strike is against a public service agency and as such is unjustifiable.

Interior Will Restudy Oxbow Damsite License

Resumption of FPC hearings on Idaho Power Co.'s Oxbow damsite license has been postponed to May 13 in Washington, D. C., to allow study of the project by Department of Interior officials.

Interior Secretary Douglas McKay asked continuance of the hearings for further study by his department, which was one of the intervenors against the company's license application. Former Interior Secretary Chapman had protested the Oxbow plant on grounds it would be a detriment to the Hells Canyon project.

Another government intervenor against the company, the Department of Agriculture, recently notified FPC it was withdrawing from the case.

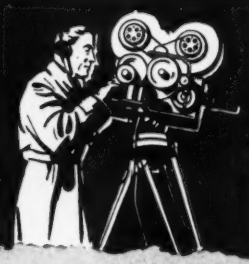
Idaho Power President T. E. Roach said construction would start on the Oxbow plant this year if approved by the FPC. He stated that the company must initiate construction of new power generating facilities this year to prevent power shortages in the Snake River Valley.

The Oxbow project has been before FPC for more than five years. The company first filed application for preliminary permit in 1947, followed with an application for license in 1950.

New Mexico Public Service Starts Expansion Program

Public Service Co. of New Mexico has begun work on a $7,000,000 expansion program for 1953 with two transmission lines, one between Santa Fe and Las Vegas, 70 miles, at a cost of $1,000,000; and a supplemental line between Albuquerque and Belen, 31 miles, to stabilize service, at a cost of $300,000.

During February the company's stockholders authorized an increase of $8,000,000 in capitalization, raising the authorized capitalization from $13,000,000 to $21,000,000. Issuance of from 30,000 to 60,000 shares of preferred stock and a million shares of common (par value $5) was authorized, according to an announcement by Arthur Prager, president.



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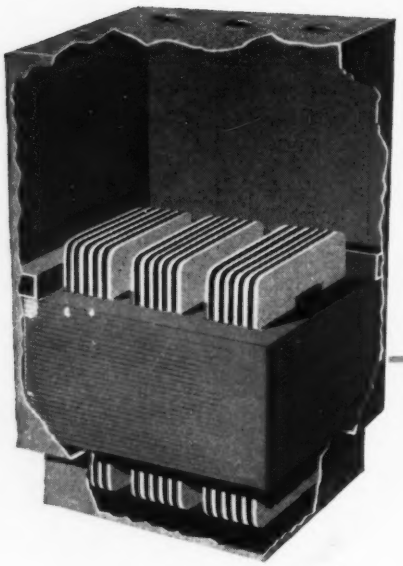

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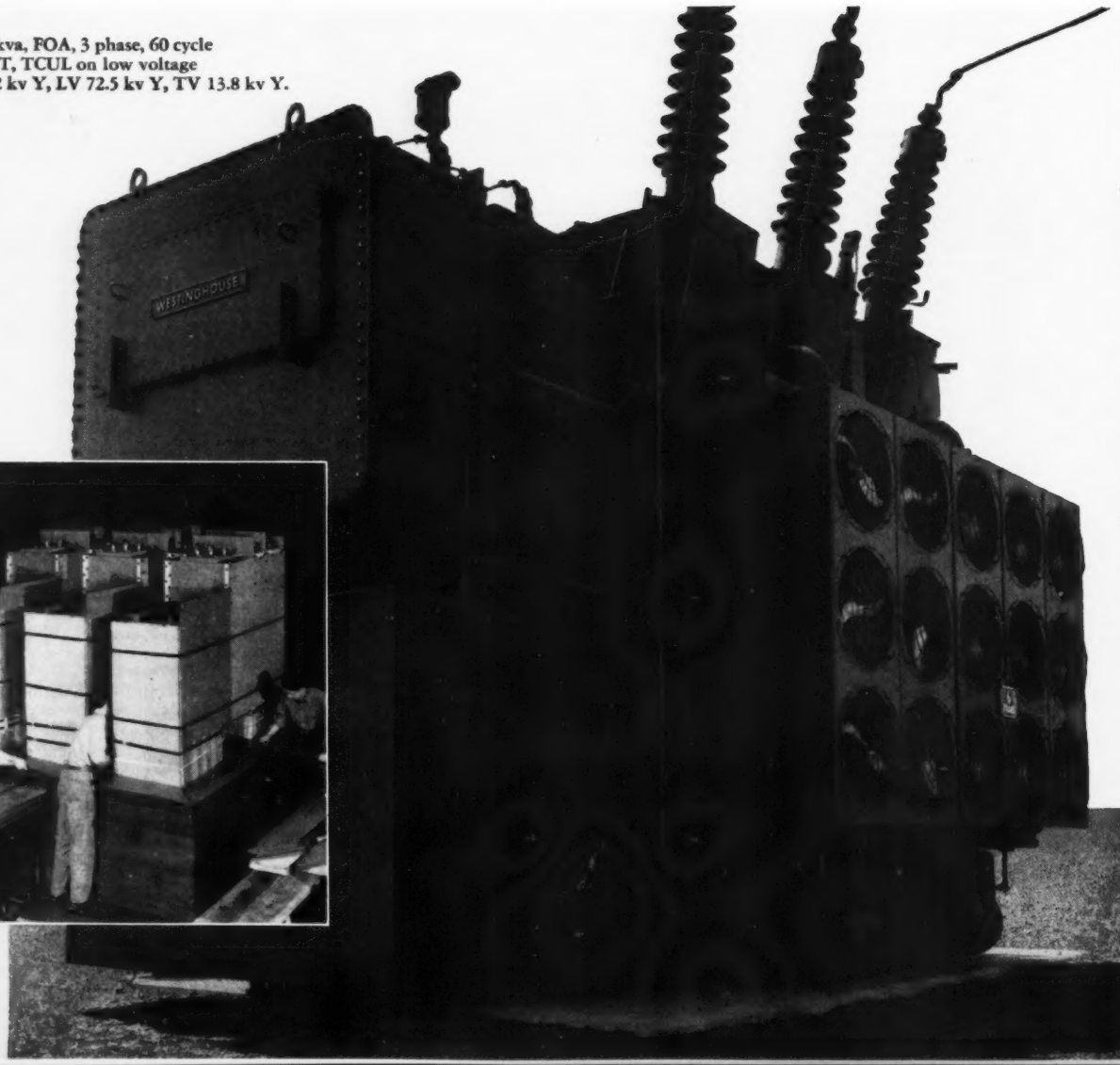

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CVP CONTRACT ATTACKED IN STATE LEGISLATURE

Signing of a contract to deliver Central Valley Project power outside the State of California was attacked in a resolution adopted by both houses of the California Legislature.

The resolution stated, "The fulfillment of the purposes for which the Central Valley Project was conceived requires that power generated in connection with the Central Valley Project be utilized first to meet the needs of the people within the state and to accomplish the full utilization of the central valley works before any power is made available for use outside of California."

The resolution was aimed at the Bureau of Reclamation - Colorado River Commission of Nevada agreement in which the Nevada agency would receive 35,000 kw of power if the agency could make arrangements for transmitting the energy from the CVP load center at Tracy, Calif.

To do this it would require the use of the facilities of the Pacific Gas and Electric Co. and Southern California Edison Co.

In its resolution, the California Legislature urged the two power companies not to enter into any wheeling or other agreement that would facilitate the delivery of power developed by the CVP for use outside of California.

The resolution also urges the California Public Utilities Commission to defer approval of any contracts providing wheeling of power developed by CVP facilities until the legislature can consider measures "necessary to protect the public interest in connection with such contracts."

The USBR-Colorado River Commission contract will be void if arrangements cannot be made by June 30 to wheel the power to Nevada.

CVP Purchase Study Is Ordered by Legislature

The California legislature has ordered a study to determine the feasibility of state purchase of the Central Valley Project on the installment plan.

State Engineer A. D. Edmonston and the California Water Project Authority, in a resolution adopted by the senate and the assembly, are directed to make a report by June 1.

The resolution, authored by Senator George J. Hatfield (R) of Merced County, points out studies heretofore were based upon the assumption that all reimbursable costs would be paid in full by a single payment to the federal government and did not include studies based upon the assumption that repayment might be made in installments over a period of years without interest in the manner contemplated by the federal reclamation laws.

State Engineer Edmonston already has recommended as feasible state ownership of the project and detailed studies now are underway by the California Water Project Authority, of which Edmonston is executive officer, to determine the advisability of such a step.

The legislature has earmarked $10,000,000 in state funds as a "down payment" to stress the state's seriousness in the matter.

No Commitment Made on New Bonneville Rates

Customers of the Bonneville Power Administration at a meeting March 10 in Seattle didn't learn very much about Bonneville's proposed new wholesale rates expected to take effect in December 1954, except that they will be anywhere from 10 to 25% higher than present rates.

The rates cannot be set until a number of imponderables can better be taken into account, said William A. Dittmer, Bonneville power manager. Unknown factors include future allocation of flood control, reclamation and power costs in multipurpose dams; timely construction starts on proposed projects such as Libby and Hells Canyon Dams and a possible differential between firm and interruptible power rates, now the same.

New power requirement contracts may include a provision that utilities must obtain permission from BPA before negotiating a contract with a customer for more than 5,000 kw, Dittmer said.

Paul J. Raver, Bonneville administrator, declared the agency would have no power for direct sale to new industries until 1957 other than 120,000 kw earmarked for an aluminum plant near The Dalles, Ore., with private power companies to get the next 500,000 kw of new power to be generated by federal plants. Only a worsening of the international situation, with a consequent further allocation of power to defense industries, could affect this commitment to the private power companies, Raver said.

● **Pacific Gas and Electric** Co. has reissued its comic book for kite-flying youngsters. The booklet lists eight precautions for kite flyers and contains designs for making kites at home. It is free at local offices of the utility.

OREGON LEGISLATORS VOTE FUNDS FOR COMPACT STUDY

Oregon legislators have set up machinery for state participation in any move the Pacific Northwest states may initiate in writing a Columbia River Basin interstate compact by which the states might acquire existing federal hydroelectric projects and take over the job of development of the basin water resources.

The Oregon legislature voted almost unanimously approving a resolution to appropriate $20,000 for Oregon's share in any regional conference with neighboring states of Washington, Idaho, Montana and Utah. The money will be used by the 15-member state committee on interstate cooperation, an organization that already exists.

Before the states could go ahead with any proposal they may formulate, the compact would require congressional approval as well as legislation action by the respective states.

Meanwhile, the House committee on state and federal affairs has sent to the floor with its blessing a bill to create an Oregon Water Resources Interim Legislative Committee and recommends spending $50,000 for a comprehensive report to be submitted to the next legislative session in 1955. The bill provides that the governor shall appoint the committee that would evaluate Oregon's water resources and report on how the state may best utilize them for power, irrigation and fish propagation.

Washington Bill Would Protect Small Towns

Washington State House of Representatives has passed a bill at the instigation of several towns in King and Pierce counties, now served by Puget Sound Power & Light Co., that dislike the idea of possible PUD ownership of the power system. The bill would allow cities and towns of fewer than 100,000 population in areas where there is no operating PUD to condemn power facilities within their corporate limits.

● **New Discoveries,** a folio of engravings by the 16th century artist, Johannes Stradanus, originally published in Antwerp in 1638, has been reproduced as the latest publication of the Burndy Library, Norwalk, Conn. It contains translations of the Latin text and foreword by Dern Dibner, president and founder of the Burndy Library and Burndy Engineering Co.

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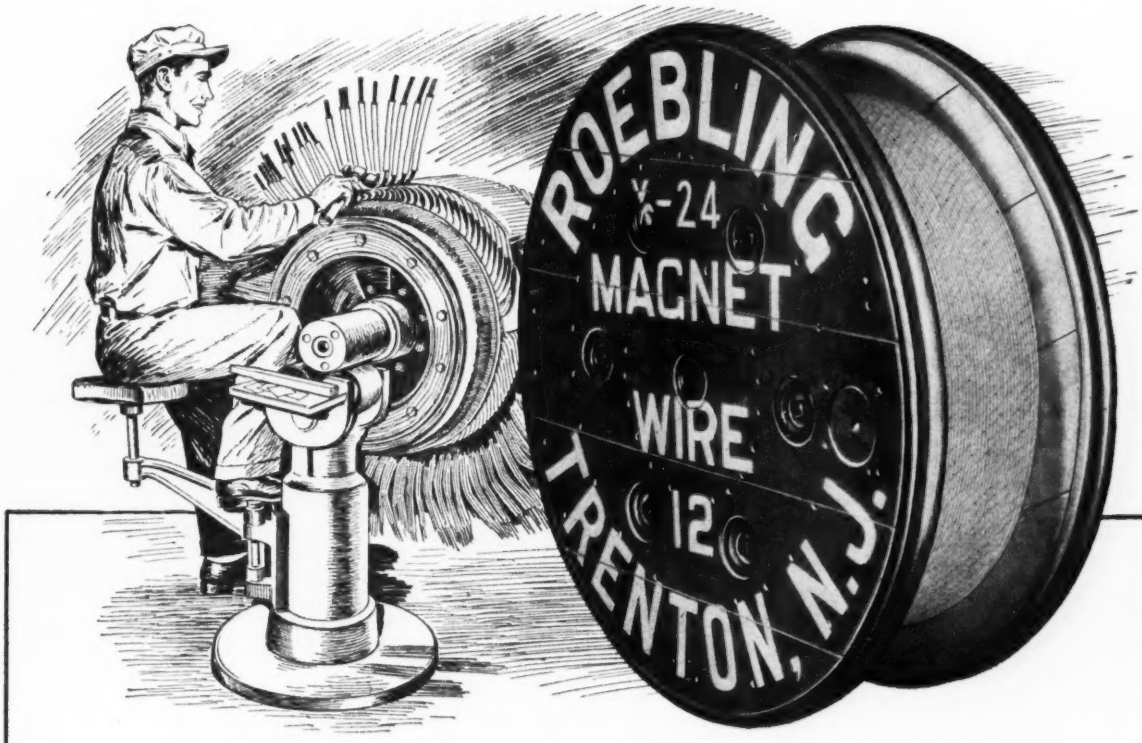

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COLORADO TO VOTE AGAIN ON STATE COMMISSION

Colorado voters, who said "no" last fall, will be asked again in 1954 to vote on a proposed constitutional amendment to give the State Public Utilities Commission authority over all utilities except those municipally owned.

The current legislature has approved a resolution placing on the ballot again the amendment that was turned down by a vote of 173,652 for to 203,732 against. The amendment vote was light compared with the 625,286 who cast presidential ballots in Colorado last fall.

"There was confusion and we didn't get our story over," said Jerry Mahoney, secretary of the Colorado PUC, in reviewing the defeat.

There are 14 home rule cities in Colorado, which under the state constitution have authority to regulate all utilities, except the Mountain States Telephone and Telegraph Co. Under a February 1952 decision of the Colorado Supreme Court the telephone company is now regulated by the PUC.

The home rule cities, including Denver, have most of the population in Colorado. Figures prepared in 1950 show the PUC had jurisdiction in that year over electric service to 38% of the state's residents. The other 68% of Colorado's residents were in home rule cities outside PUC regulation. Approximately the same percentage applied to telephone service.

The present confusion over who has the authority to regulate utilities in Colorado has resulted in the Denver Tramway Co.'s going into U. S. District Court to obtain decisions granting rate increases.

The Public Service Co. of Colorado, Denver, gained its last rate increase through a 20-year franchise granted by voters in 1947. Denver's city council has proposed a charter amendment, to be voted on in a special election June 16, which would establish a municipal PUC to regulate all utilities within Denver.

● **A judgment** filed in Clallam County Superior Court at Port Angeles, Wash., by Judge H. G. Sutton directs the City of Port Angeles to pay $19,033 to the Clallam PUD, plus court costs and 6% interest since April 1. The PUD, which supplies power to the city, brought suit when the city withheld payment of the sum, maintained by the PUD to be the city's share of a severance charge paid on a former contract with Puget Sound Power & Light Co. The city alleged the PUD had overcharged it for power.

FOR REAL HELP TO SMALL BUSINESS

It is ironic that one of the first jobs of the Eisenhower administration, so widely, and erroneously, tagged as a "big business" administration, must be to go to the relief of small business. This is necessary because the preceding administration, while continually proclaiming its tender regard for small business, actually impaired gravely the ability of small business to carry on successfully. This it did in the necessary haste of devising an emergency tax program to finance rearmament and the Korean War. Now the new administration must revise this tax structure to give small business a chance to make its key contribution to an expanding American economy.

How Taxes Hurt Small Business

Since the outbreak of the Korean War, small business has been handicapped by two principal features of the emergency tax program:

1) Many small firms are unable to retain enough of their earnings to provide for expansion because these earnings are drastically limited by the excess profits tax.

2) Small companies have received a very small share of the tax concessions allowed by the federal government to encourage construction of defense facilities.

A small business that succeeds and hence grows is particularly hard hit by the excess profits tax. That tax, of course, applies to corporations having a net income of more than $25,000 per year. It results in taking up to 82 cents on every dollar of profit that the company earns above what is called an "excess profits credit." For most small companies the credit depends on what was earned in 1946-49. This creates an element of gamble and discrimination in determining the amount of tax to be paid. Time has proved that it is impossible to select a base period for the tax that is fair to all companies. A young company starting in 1946-49 is peculiarly vulnerable, as its earnings in that period were necessarily low. Even on modest earnings today, it would pay a high excess profits tax.

It is true that Congress wrote into the excess profits tax law provisions to lessen the impact of the tax on growing companies. However, none of these provisions in practice has given much relief to small business.

"Relief" Provisions Give Little Relief

Small firms rely almost entirely on retained earnings to provide funds for improving their plants and equipment. They get very little help from the provisions (1) that no more than 70 per cent of total profits can be taxed away, (2) that additional earnings are allowed on an increase of invested capital or (3) that growing companies are allowed a

rate of return on capital equal to the industry average.

Most large firms can obtain additional funds in the securities market. But small firms find it difficult to increase their capital by selling securities, since investors generally prefer the stocks or bonds of nationally known and seasoned companies. Few small companies, therefore, can reduce their tax burdens by increasing their invested capital, and few can meet their needs for equity capital if their rates of profit are no higher than those of the leading companies which generally set the average profit.

Small business has been equally at a disadvantage in the matter of accelerated depreciation for tax purposes. The government has encouraged a great expansion of our industrial plant, despite the very high rate of taxation on corporate earnings, by granting certificates of accelerated amortization on new plants built to support the defense program. These certificates allow business to charge off the cost of defense plants at a rapid rate. This decreases the earnings that are subject to taxes, and so increases the part of the earnings that may be retained in the business.

Growth is Stifled

But most of these tax concessions have been made to large firms especially equipped to handle the complex problems of defense production. Of the $12 billion of new facilities so far approved for fast amortization, only 11 per cent are for companies with less than 500 employees, although the share of such companies in the normal civilian business is about 30 per cent. In only 2 of 12 industries studied by the Small Defense Plants Administration were small firms receiving what was estimated to be a fair share of the total tax amortization awarded.

Because they are unable either to retain enough earnings after taxes or to step up their depreciation allowances, most small firms are unable to keep up in the race to expand and modernize plant capacity. The Small Defense Plants Administrator, in his report to Congress, emphasized that small companies have been unable to do their full part in the defense program for lack of capital.

The Council of State Chambers of Commerce recently published an eight-state survey showing widespread cutbacks of plans for new plants by small and medium-sized companies. According to this report, "high federal taxes enacted since the beginning of the Korean War appear to be placing an effective brake on the rate of industrial expansion in all the states surveyed and probably in the 48 states generally . . . It is principally the small and medium-sized companies whose growth is being stifled."

Some Ways to Help

The first step to relieve small companies should be to free them from the excess profits tax. The nation as a whole would be far better off if the excess profits tax were allowed to die as scheduled on June 30, since the tax promotes waste as it stifles incentives. It is quite possible, however, that the politics of tax reduction, as opposed to the economics, will prevent the elimination of the tax during 1953.

If the tax is extended, provision should be made for a much broader exemption to smaller corporations. If net income up to $100,000 a year, which in these days still constitutes small business, were exempted from the tax, the loss of revenue to the government would be about $175 million. This relatively small amount could easily be offset by an increase in employment and incomes if small business is freed from its financial strait jacket and allowed to expand. Careful attention should be given also to the possibilities of allowing a higher rate of return on the first $1 million of capital (roughly the amount it takes to provide 100 jobs) and of making special accelerated depreciation allowances to smaller firms. This is a matter so important that we shall return to it in a future editorial.

Relief for small business—relief from a financial paralysis that has kept it from playing its dynamic part as a growth element in our economy—would do much to give the lie to the notion that the Eisenhower administration is a "big business" operation. Much more important, it would be a long stride toward releasing the dynamic energies of many small businesses and businessmen to forward a continuing and expanding prosperity.

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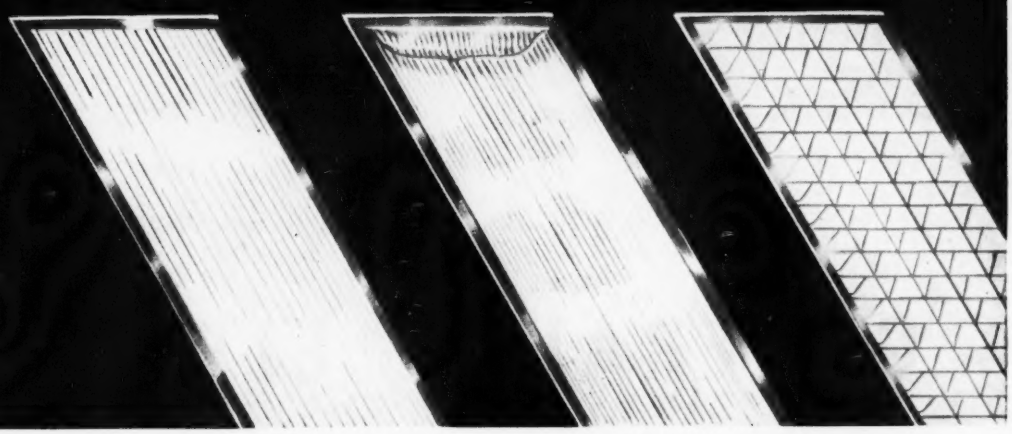

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FIRST INSTALLATION of new Form 206 luminaires was made in December, 1952, by Dayton Power and Light Company, at Oakwood, Ohio. A total of 52 Form 206 luminaires light the city's main business street.

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NEW MODERN APPEARANCE. Because all wiring can be internal, appearance of the new Form 206 can be free of unsightly wire loops. The Form 206 Luminaire can house its ballast, eliminating pole mounting. Natural aluminum housing and clear plastic globe in sleek, clean design make a dramatic, modern addition to any city's main business streets.

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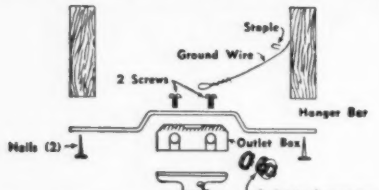

2 Nails to mount Hanger Bar
2 Screws to mount Box to bar
2 Cable Connectors
P. C. Receptacle Cover
Ground Wire
Outlet Box
G.W. Staples
Hanger Bar

11 THINGS, Count 'em, ELEVEN!!

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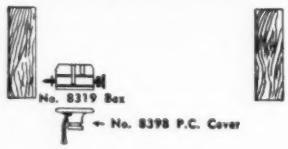

1 No. 8319 Box
1 No. 8398 P.C. Receptacle Cover
} Nothing Else

NO Hanger Bar
NO Loose Nails
NO Loose Screws
NO Connectors
NO Ground Wires
NO G.W. Staples

2 THINGS, Count 'em, ONLY TWO!!

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PGE ASKS LICENSE FOR STORAGE RESERVOIRS

Portland General Electric Co. has applied to the Federal Power Commission for permission to build two storage reservoirs upstream from present Clackamus River power plants. Cost for the two is estimated at $4,800,000 and officials said the added resources would increase maximum capability at the 34,000-kw Oak Grove power house to 50,000 kw. Firm power gains are figured at 10,000 kw in the release of stored water to downstream generators at Oak Grove, Cazadero and River Mill.

Smaller of the two reservoir proposals was described by Waldemar Seton, PGE vice-president, as actually a forebay to be located two miles above Oak Grove. An earth fill structure, it would store 400 acre-ft of water. The other would be at Timothy Meadows, 11 miles above the Oak Grove intake, and would be a 100-ft-high earth and rock-fill dam with maximum storage of 60,000 acre-ft. This lake would cover an estimated 1,340 acres.

Seton reported the Timothy Meadows reservoir would be used primarily during the September-March periods of low stream flow.

Approval of FPC has been asked through an amendment to PGE's license for the Oak Grove project. The larger unit will require additional approval from the Oregon hydroelectric commission, the regulatory group that blocked the company's Pelton project on the Central Oregon Deschutes River last year.

The company said March 5 that if there are no undue licensing delays, the smaller unit would be completed by September 1953, and the larger reservoir by March 1955.

● **During the current year** Vancouver, B. C., will install new ornamental street lights to the value of $419,000. Property owners will pay the major share of the cost, $264,617, while the city will pay $154,677 out of general revenue. The lighting has been approved by the city council and will be installed under two plans, by petition, where majority of residences have already requested it and by initiative, where the city is proposing the plan and will proceed unless a majority of owners sign a petition against it.

● **FPC** has suspended a proposed $419,400 annual increase in electric rates to Pacific Gas and Electric Co. for sales to Sierra Pacific Power Co. A hearing will commence in April in Washington, D. C.

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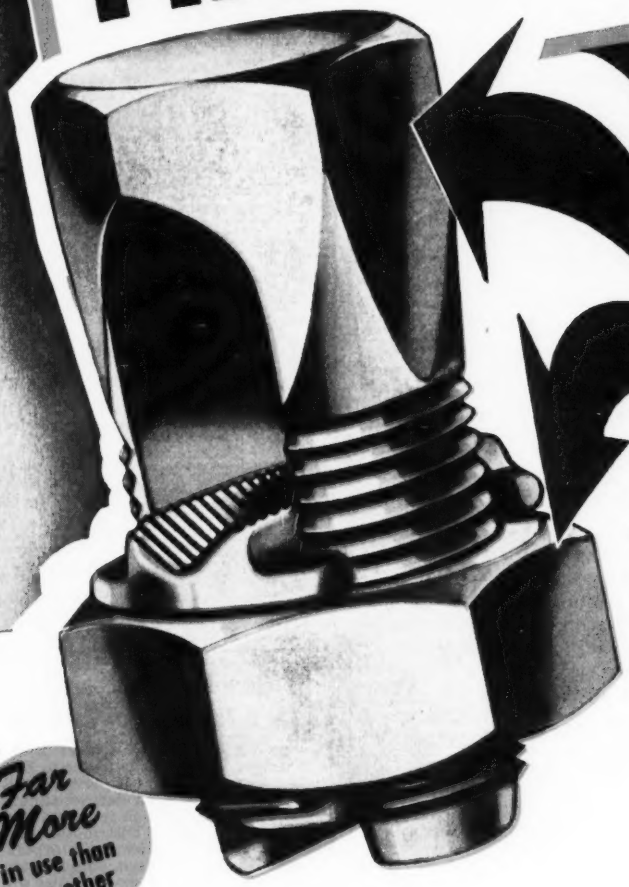

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Vol. LXXV
January-June, 1920

Vol. LXV
January-March, 1915

Vol. LXIV
July-December, 1914

These are bound volumes in good condition. Rather than destroy them we would like to give them to anyone who would have use for them. Write to McGraw-Hill Co. of California, 68 Post Street, San Francisco 4, Calif.

BONNEVILLE REQUESTS FUNDS FOR FISCAL YEAR

Bonneville appropriation requests for the fiscal year beginning July 1, 1953, total $62,600,000 and represent a reduction of more than 14% from current fiscal year appropriations, BPA officials announced. A $10,523,400 decrease reflects shorter distances involved in reinforcing the main grid and carrying power to load centers from dams now under construction.

A $55,200,000 construction program for the coming year provides for completion of major transmission lines and substations to carry power from Chief Joseph Dam to Puget Sound and Olympic Peninsula areas, from McNary Dam to Walla Walla, Pendleton, The Dalles, Portland-Vancouver and upper Willamette areas, and from Willamette Valley power projects to southwest Oregon. Funds include about $39,000,000 to complete grid facilities now under way, $14,000,000 for transmission to serve new load centers and meet load growth of present customers, and $2,000,000 for general plant improvements and additions.

Budget requests for Chief Joseph Dam grid facilities total $14,387,000. Transmission for McNary Dam generation accounts for $20,690,000 and other major 230,000- and 300,000-v grid facilities requested amount to $11,283,000.

Northwest area budget requests, primarily 115,000-v transmission facilities to serve northwest and north central Washington total $2,515,000.

Southwest area facilities, including southwest Washington, Portland-Vancouver, Willamette Valley and southwest Oregon load centers, account for $3,839,000 in the budget.

Northeast area requests for northeast Washington, northern Idaho and Montana amount to $1,000,000.

Southeast area budget requests for Central and southeast Washington and central and northeast Oregon total $1,476,000.

Operation and maintenance budgets for the new fiscal year total $7,400,000 as compared wtih $6,600,000 for the current year. The increase represents funds to operate and maintain additions to the Bonneville system being placed in service during the next 18 months.

● **Businessmen** at Anchorage and Fairbanks, Alaska, are seeking to raise $17,000 to arouse federal interest in building a power dam on the Susitna River and to interest private industry in the power that would become available. The Bureau of Reclamation has studied the project.

Pennsylvania
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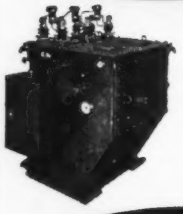
ITS NEW LINE OF

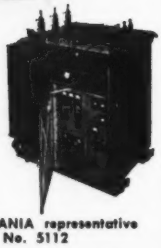
STEP VOLTAGE REGULATORS



20.8 Kva, 2400 Volts through 750 Kva, 13,800 Volts

UNIT SUBSTATIONS

1000 Kva through 3000 Kva, 12,000 Volts through 34,500 Volts Primary



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HEARING SET FOR COPCO APPEAL IN STATE SUIT

The California third district court of appeal has set April 9 as the date for a hearing on the California Oregon Power Co.'s request for dismissal of a suit filed by the State of California against the power firm.

The state's suit, filed by the attorney general's office in the Siskiyou County superior court, seeks an order compelling Copco from causing fluctuations in the Klamath River water flow.

The attorney general's action contends the operations of Copco's No. 1 and No. 2 power dams result in death annually to hundreds of thousands of young trout and salmon and endangers the lives of swimmers by sending sudden high water fronts down river.

Copco claims the courts lack jurisdiction. The appeal court ordered the superior court to hold up action until a decision is made on the jurisdictional question.

Contract Let for Line from Chief Joseph to Snohomish

Bethlehem Pacific Coast Steel Co., San Francisco, was low bidder at $2,844,406 for tower steel to build the 135-mile Chief Joseph Dam-Snohomish 345-kv transmission line. Bids were open Feb. 26.

Bonneville Power Administration spokesmen said regular double-circuit-type towers will be used on 97 miles of the line, the rest will be single-circuit type. The first circuit must be completed in December 1955, when Bonneville expects installation of four Chief Joseph power house generators to be operating. The second circuit must be ready by the fall of 1957.

Plans for the line call for installation of 230-345-kv autotransformers by the fall of 1958 and 230-345-kv lines ready to carry the full potential from 18 generators in 1959. Generator capacity is scheduled at 1,000,000 kv by that date.

● **Bids** for furnishing six 100,000-hp hydraulic turbines for Chief Joseph Dam on the Columbia River near Bridgeport, Wash., have been called by the Corps of Engineers, for opening May 6 at Seattle. Each turbine must have a rated capacity of 100,000 hp at 100 rpm at 165-ft head and 82,000 hp at 148-ft head. Specifications call for vertical-shaft, single-runner, Francis-type turbines with plate-steel spiral cases embedded in the concrete substructure of the power house.

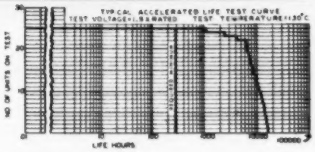
Further Proof of

Getting to the bottom of things

. . . is most clearly demonstrated by what we are doing every hour of every day — year in and year out — to make a finer fixed CAPACITOR.

One of the many things you as users are interested in is the "LIFE OF THE CAPACITOR" under a multitude of operating conditions. We in the FAST organization have spared no expense to give you honest-to-goodness answers on this important factor in providing quality capacitors.

What follows is a summary of what we are doing to give you just that . . .



I: RESEARCH and DEVELOPMENT TESTS

AC and DC tests at various temperatures and voltages.

1—Investigation of Impregnants: (a) New impregnants AC—synthetic and natural oils. DC—oils, resins and waxes. (b) Studies of impurities and additives.

2—Investigation of electrode separators and electrode materials: (a) Modified kraft papers—low PF varieties and sundry densities. (b) Films—regenerated cellulose, polystyrene, teflon, "Mylar"*, Etc.

3—Number of groups tested: AC; over 800 involving more than 8000 units. DC; over 3300 involving more than 70,000 units.

4—Duration of tests: AC; many have been continuously under test for over 6 years. DC; many have been continuously under test for over 10 years.

5—Voltage range of tests: AC; 70 to 2400 volts at 60 and 400 cycles. DC; 140 to 44,000 volts.

6—Temperature range of tests: AC; Room to 130°C. DC; —55°C to +150°C.

II: PRODUCTION TESTS

A. Alternating Current

1—Heat runs on production lots—ultimate surface temperature rise.

2—Ultimate life hours of current production (periodic tests run).

B. Direct Current

1—Civilian Production: (a) ultimate life hours of capacitors taken from current production. (These test runs comprise over 1600 groups involving more than 16,000 units)

(b) Ultimate life hours of capacitors after being stored in cartons from 1 to 24 months under normal variations in humidity and temperature. (These test runs comprise over 230 groups involving more than 2300 units)

2—Military Production: (a) Test to applicable specifications (Jan. C-25; Jan. C-91; U. S. Army 71-1667; Etc.)

(b) These test runs comprise over 3300 groups involving more than 19,000 capacitors.

Please note Carefully: at least 80% of the 115,300 capacitors included in the above tests were tested to destruction at voltages from 1½ to 4 times rated and at maximum rated—or in excess of—operating temperatures. Many outside this group have not failed to date. Importantly too, this is a continuous policy of the company in sustaining our testing program throughout every day—year after year.

So with pardonable pride may we suggest QUALITY CAPACITORS is more than a "catch-phrase" as applied to the FAST organization . . . and another link in the chain of GETTING TO THE BOTTOM OF THINGS?

* *Du Pont trade-mark for Polyester Film*

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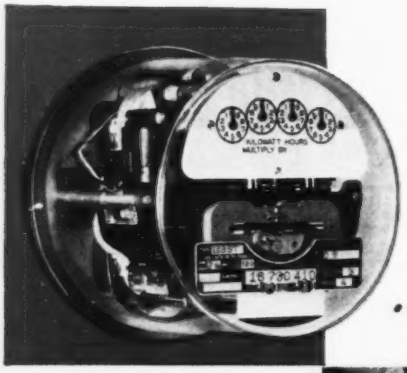
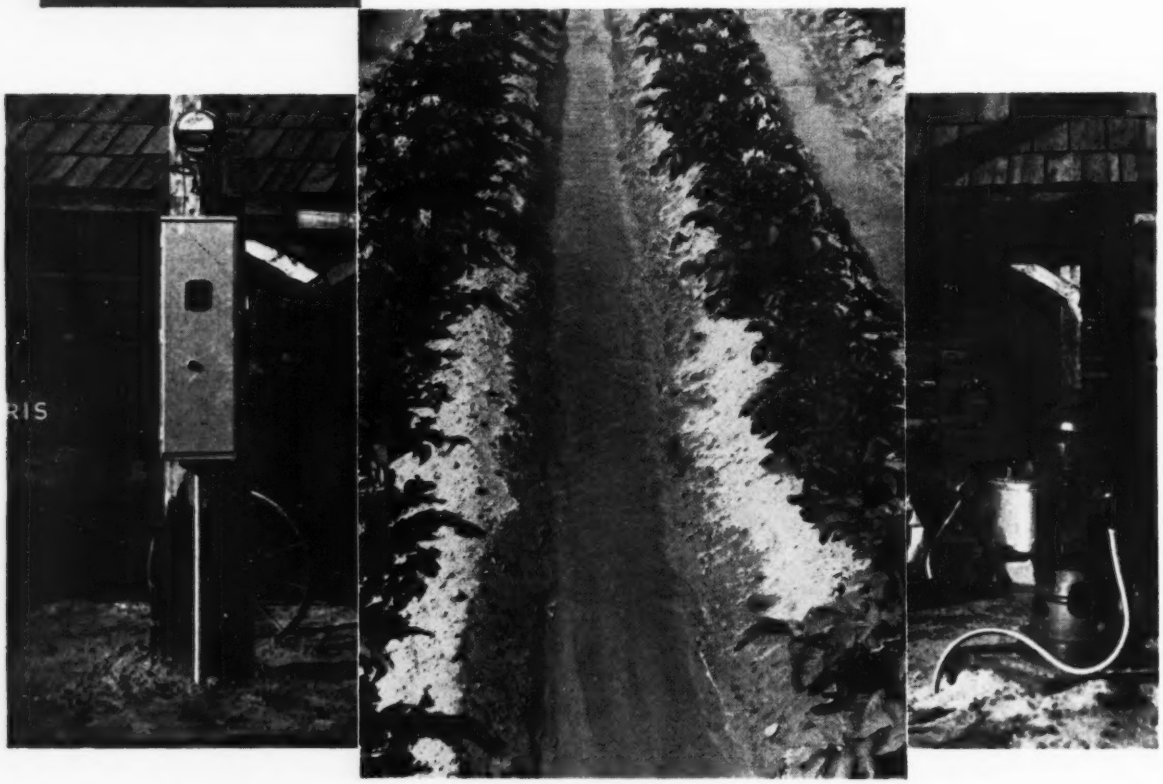


Sangamo *Corrosion-Resistant* Polyphase Meters

... Best choice for outdoor installations



Use them to measure irrigation pumping loads

Both external and internal parts of Sangamo Polyphase Meters are treated with special finishes that protect them against deterioration on outdoor installations. This assures much longer meter life and better performance in humid, salt-laden or corrosive atmospheres. That's why they're an ideal choice to measure irrigation or oil well pumping loads.

All Sangamo Polyphase Meters, whether 2, 2½ or 3 element, have single disk construction, and consequently are small in size and light in weight—easy to handle and easy to install.

Your Sangamo Representative will be glad to give you full information on Sangamo Polyphase Meters.

Only Measured Facts are Known Facts

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SPM 53—1

NEW ACCOUNTING METHODS ORDERED BY COMMISSION

Accounting methods by which two electric utilities can handle quick depreciation of emergency defense facilities without affecting their rate schedules were ordered March 18 by the Idaho Public Utilities Commission.

The Idaho PUC issued separate orders specifying bookkeeping practices by which Idaho Power Co. and Washington Water Power Co. will figure, for rate-making purposes, the amortization on the C. J. Strike and Cabinet Gorge Dams for which the federal government granted certificates of necessity permitting depreciation over a 60-month period.

The accounting procedure ordered by Idaho PUC has the effect of permitting the companies to spread depreciation on the two plants over the normal 40-year period on which rates are based, and at the same time take advantage of whatever income tax benefits accrue immediately from the quick write-off method. Under the order, quick depreciation will have no effect on rate schedules.

The action was the result of an order issued by the commission on Feb. 17 for all electric utilities in the state to show cause why tax benefits from quick write-off should not be passed on to power customers. Hearings disclosed that only three companies had received approval for accelerated depreciation from the federal government.

The commission decided Utah Power & Light Co.'s authorization for $175,000 emergency plant construction in Idaho was negligible and was excluded from further revision of accounting methods.

Because Washington Water Power is undergoing merger negotiations, the commission decided to permit it to use a different accounting method than was ordered for Idaho Power. A PUC spokesman said effect of this decision increases the equity of WWP stockholders by allowing the company to place into a restricted earned surplus account the amount of money by which federal income taxes will be reduced by quick write-off, less the amount of the reduction which would have resulted from normal income tax depreciation.

After the five-year period, when accelerated amortization results in increased income taxes, WWP will credit to its account for current income taxes deferred in prior years an amount equal to such increases in income taxes and charge the same amount against the restricted earned surplus account.

The PUC ordered that amounts carried in the restricted earned surplus account will not be available for dividends.

The order to Idaho Power pointed out that fast write-off of emergency plant costs "in lieu of normal depreciation for federal income tax purposes will result in reduction in federal income taxes during the period of amortization, and increase federal income taxes during any remaining life of any such facilities so amortized.

"The actual effect of the rapid amortization of the costs of defense facilities is not to create additional income or a tax saving under the section, but it will defer federal income taxes until after the 60 month period," the order continued.

It specified that the company account for property covered by quick write-off certificates "in the same manner as other property of the company and shall record depreciation of such facilities on its books at the normal rate of depreciation."

The PUC further ruled that the company set up an account designated "provisions for deferred income taxes" during the time quick write-off results in reduced income taxes and charge such savings against the account, while crediting an equal amount to reserve for deferred income taxes. After the five-year period, when higher taxes result, the company will charge such increases resulting from accelerated amortization against the reserve for deferred income taxes, until such reserve is exhausted, and shall credit the same amount to the account designated current income taxes deferred in prior years.

At the end of the five-year period, the commission will prescribe how long the reserve will be credited back to current income taxes deferred in prior years.

Power Company Lets Contract For Morro Bay Steam Plant

Pacific Gas and Electric Co. has let the contract for its $44,000,000 Morro Bay steam plant to the Bechtel Corp., and construction will begin as soon as designs can be completed.

Completion of the new 300,000-kw plant and the five other hydro and steam-electric projects under construction or on the active schedule will boost the company's total generating capacity to 4,581,000 kw by the end of 1955.

The Morro Bay plant will be built on a 140-acre site at the north end of Morro Bay, San Luis Obispo County, Calif.

SUPERVISOR HOLDS UP UTILITY FRANCHISE

On advice of the county counsel, the Los Angeles County Board of Supervisors has held up passage of an ordinance granting a new 50-year franchise to Southern California Edison Co. for use of streets in unincorporated county territory. Edison requested the new franchise to replace one granted in 1933, on the grounds that the market position of its bonds would be strengthened by the later expiration date.

Gerald G. Kelly, assistant county counsel, advised the supervisors that passage of the ordinance with phraseology requested by Edison would jeopardize the county's interests in a $1,000,000 suit pending against Edison, Southern Counties Gas Co. and Southern California Gas Co.

At stake in the suit is the method of defining gross receipts of the utilities that arise from possession of franchise. The county gets a 2% share of such revenue.

The county contends that all distribution facilities located within unincorporated territory—including office space and installations on consumers' property—should be figured. The utilities contend that only that equipment actually located on county roads can be counted in calculating the county's share.

The county is suing for the difference in fees between the utilities' calculations and its own, from 1936 to the present. A Superior Court decision last May held for the utilities. The county has appealed and the case is now pending in the District Court of Appeals.

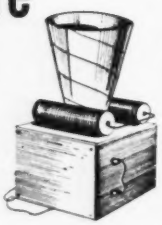
Earth Fault May Delay Work On Folsom Dam Project

An earth fault in the left abutment of the Folsom Dam project on the American River near Sacramento, Calif., may delay work on the dam for a year or longer, but will not affect construction of the power plant.

A 162,000-kw power plant at the damsite is being built as a Bureau of Reclamation project by the Guy F. Atkinson Co. of South San Francisco.

Spokesmen for the Corps of Engineers, who are building the dam, say the fault is in a "substantial" part of the left abutment, 30 ft below the foundation. The fault failed to show in initial explorations or rough excavation work. Work has begun on mining out the rock overlying the fault zone. It will be replaced with concrete.

"Watson, come here —I want you!"



Alexander Graham Bell could have telephoned his assistant many years before 1876—IF the supplies he needed had been available.

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NEWS ABOUT PEOPLE

Arizona Public Service Makes Organizational Changes

Arizona Public Service Co. has announced major changes in its executive organization and regrouping of its service operations. The new setup results from growth of the company and, in the case of the executive changes, added responsibilities of President **Henry B. Sargent.**

John T. Kimball and **A. H. Forman Jr.** have been made executive vice-presidents, with the former in charge of sales and service and the latter heading planning and production activities. **John L. Liecty,** treasurer, has been given added duties as head of the financial and accounting group. **D. R. McGregor** will head sales and personnel.

Service operations have been regrouped into three divisions—Phoenix, Northern and Southern—replacing the former Valley and State divisions. **Lee H. Poe** heads the Southern division, including the Buckeye, Yuma, Casa Grande Valley and Bisbee-Douglas districts. **William P. Reilly** is in charge of the Phoenix division, which includes metropolitan Phoenix, Sunnyslope and Tolleson. **F. T. Fahlen Jr.** manages the Northern division, embracing the Wickenburg, Prescott, Winslow, Globe-Miami and Chandler districts.

Sales managers are **C. G. Ekstrom,** Southern; **George Hill,** Northern; **Jack Kiedaisch,** Phoenix. **H. H. Idle,** former Yuma district manager, will assist Reilly. **L. R. Kimmich** succeeds Idle in Yuma. **R. B. Nairn** is Winslow district manager and **Harry Dunfee** Flagstaff manager.

● **James H. Knowles,** president of Hubbard & Co., visited the firm's Pacific Coast properties and distributor organizations last month. **Marshall Lasher,** vice-president, Pacific Coast division; **R. M. Waggoner,** vice-president, sales, and **N. V. Arntzen,** Los Angeles district sales manager, introduced him to the industry in Los Angeles and San Francisco.

● **Jack Amann** has been appointed branch manager of Square D's San Francisco office. He has been assistant branch manager for three years, having joined Square D in 1935 and served as a field engineer in Los Angeles and San Francisco.

Charles P. Garman receives a resolution in recognition of his service from Commissioner Duncan Shaw as Samuel B. Morris, general manager of L. A. Dept. of W&P looks on. Garman retired late in February

● **Charles P. Garman** has retired from the Los Angeles Department of Water & Power after 33 years of service. At the time of his retirement he was assistant general manager and chief engineer. Garman started his career with the Dayton Power & Light Co., moved to Los Angeles in 1911, but returned to Dayton after two years. Back in Los Angeles in 1920, he joined the department as draftsman and steadily advanced through the positions of engineer of design, engineer of design and construction, assistant chief electrical engineer, chief electrical engineer, to his post of assistant general manager and chief engineer.

● **Lane D. Webber,** vice-president of the Southern California Edison Co., died, aged 68. He joined Edison in 1935 as tax counsel and in 1941 became a vice-president.

● **Syd Cooper,** 47, a member of the Graybar organization for more than 24 years, died last month of a heart attack. He was Salt Lake City manager at the time of his death and previously had been Phoenix manager.

● **John C. Dalton,** general storekeeper for Puget Sound Power & Light Co., died in Seattle at the age of 54. He joined the Olympia Light & Power Co. in 1922 and in 1924 transferred to Puget Power.

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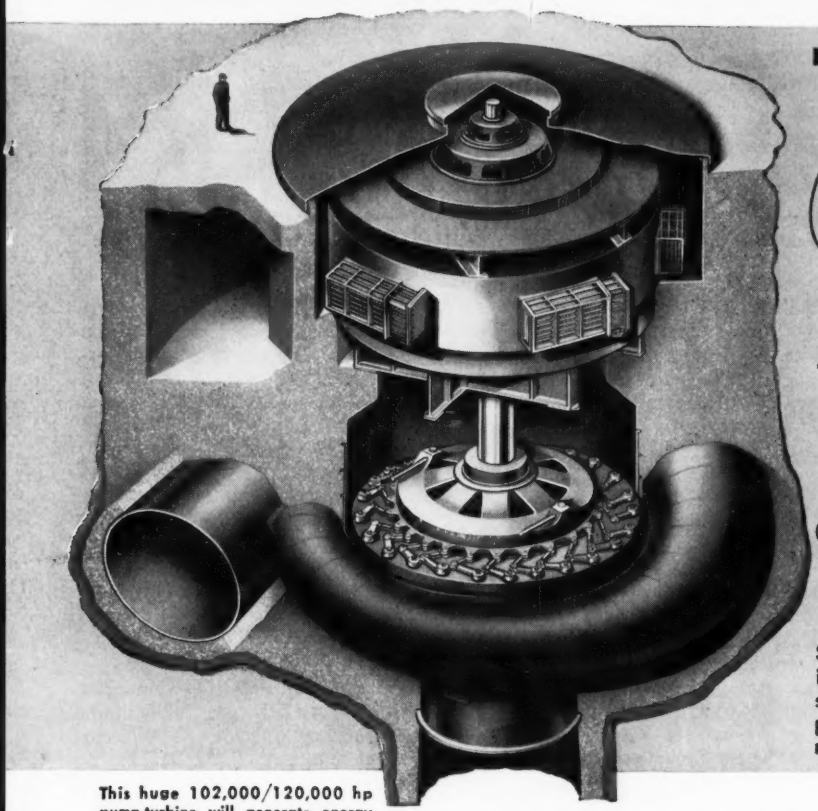
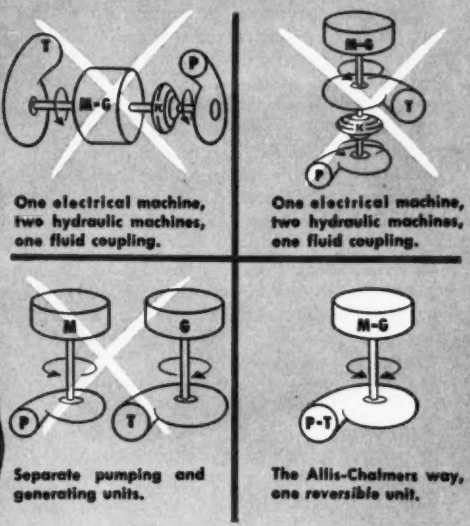
ALLIS-CHALMERS Pioneers *REVERSIBLE* Pump-Turbines!



This huge 102,000/120,000 hp pump-turbine will generate energy during peak demand periods, then reverse and — using surplus power from other plants — restore water to the reservoir during off-peak periods. Power value differential will make operation economical.

HOW REVERSIBLE PUMP-TURBINE REDUCES EQUIPMENT NEED



Sketches above show different methods of applying motive and generating equipment for pumped storage. Note that the Allis-Chalmers reversible pump-turbine at lower right requires least equipment and simplest power plant construction.

NOW BUILDING 5 UNITS FOR PUMPED STORAGE

THIS RECORD SIZE pump-turbine is now under construction by Allis-Chalmers for the Hiwassee dam in North Carolina. It combines in one reversible, two-element unit an electrical machine rated 102,000 hp as the world's largest motor and a hydraulic machine with the world's largest Francis runner.

When operating at maximum head as a turbine, this reversible unit will develop 120,000 hp. As a pump, it will move a maximum of 5200 cfs, 3.3 billion gallons per day . . . three times the capacity of the largest existing pump.

Allis-Chalmers — builder of over 12 millions of installed hydraulic horsepower — pioneered the development of the reversible pump-turbine for pumped storage. A-C offers you undivided responsibility, being able to design and build *all* elements of an entire reversible pump-turbine unit.

Of the five reversible pump-turbines A-C is now building, the Hiwassee unit is the largest. First scheduled for service is the 12,650 hp unit for the Flatiron Power & Pumping plant in Colorado. Three 19,000 hp units for the Sao Paulo Light & Power Co., Ltd., Brazil are now being built at Canadian Allis-Chalmers, Ltd., Montreal.

You get the real design advances *first* from Allis-Chalmers. And dealing with A-C is convenient, too, with 95 sales offices and 65 distributors located in 53 countries. For your free copies of Reversible Pump-Turbine Bulletin 01R7784 and illustrated, 56-page Bulletin 02B7301 of world famous hydro plants, just call your nearest A-C distributor or write to Allis-Chalmers, Milwaukee 1, Wisconsin, U.S.A. A-4011

ALLIS-CHALMERS

Builders of the World's Widest Range of Public Works Equipment

NOTES ON THE TRADE

Anaconda's Orange, Calif., bare wire mill, shown here under construction, will step up delivery of wire and cable products to West Coast customers, the company states

● **Negotiations** that may lead to sale of Pacific Electric Mfg. Corp. to Federal Electric Products Co. of Newark, N. J., were announced by Joseph S. Thompson, president of Pacific Electric, which operates plants in Santa Clara, Calif., and San Francisco for manufacture of high-voltage switchgear. The property has been valued at $6,000,000 and 700 workers are employed. Federal Electric has until late May to exercise an option to buy the stock. Sale would not result in management changes, Thompson said.

● **Triad Transformer Mfg.** Co. and Tetrad Co. Inc. of Venice, Calif., have been merged under the name of Triad Transformer Corp. Officers of the new corporation are: **L. W. Howard,** president; **O. D. Perry,** executive vice-president; **Thomas P. Walker,** vice-president; **Allan Wahlgren,** secretary-treasurer; **George Clark,** assistant to the president; **Ernest Clover,** manager of jobber sales; **E. M. Keiller,** chief engineer; **Charles Shaw,** director of purchases. The combined operations will have four new plants with more than 70,000 sq ft of floor space and 486 employees.

● **Coates Electric Mfg.** Co. of Seattle, manufacturer of heavy-duty electric heating equipment, has opened a new factory at 3419 11th Ave. S. W. It is an all-steel and concrete structure with 20,000 sq ft of working space, with loading and receiving facilities. Coates, which started as a small electrical contracting business, now makes electric steam boilers, water heaters, ovens, furnaces and other equipment.

● **Robert J. Barry,** who has had his own consulting management engineering firm in Los Angeles for seven years, has announced a change in the firm name to Barry & Co. and the addition of his brother, **Theodore M. Barry,** as a partner. Offices are at 448 S. Hill St.

● **Cemco Electrical Mfg.** Co. Ltd., 22 East Fifth Ave., Vancouver, B. C., has been awarded a large contract for low-voltage distributing equipment for the power house of the The Aluminum Co. of Canada Ltd. at Kemano and also for use in the smelting plant at Kitimat.

● **Stelmec Engineers** is the new firm name for a coordinated engineering service under the direction of **R. Sampson,** civil and structural engineer, **Henry M. Tilson,** electrical engineer, **Scott Beamer,** electrical engineer, and **C. E. Sommarstrom,** mechanical engineer, at 3736 Grand Ave., Oakland 10, Calif. Besides structural, electrical and mechanical design, the firm is equipped for development planning, economic studies, inspections, surveys and reports.

● **H. J. Randolph** Co., engineering representative serving southern California, Arizona and New Mexico, is moving its San Gabriel, Calif., office and warehouse to 736 Santa Anita St. In the new location the company will stock the most generally used items in the lines it represents. Among the firms it represents are S&C Electric, Nelson Electric Mfg. Co., T. J. Cope Inc. and Rakit Corp., Electrical Mfg. Co.

● **Garrett & Shafer Engineering** Works, 322 First Ave., S., Seattle, has been named general machinery division distributor for Allis-Chalmers in western and central Washington. The concern is headed by E. P. Garrett.

● **General Electric** Co. has announced plans to build an electronic tube warehouse in Los Angeles. **W. C. Walsh,** western manager of the Electronics Division, said the new 25,000-sq-ft building is needed to keep pace with expansion of the Western market.

● **Herb Becker** Co., sales engineer, has moved to 1140 Crenshaw Blvd., Los Angeles 19. The firm represents Sangamo capacitors, Ohmite resistors and rheostats, National receivers and parts, and other makers of electronic components.

● **Gus Rankel** has dissolved his partnership with **J. A. Markley** in the Merkley Electric, which has been operating on Main Street in Mission City, B. C., for the past seven years. Merkley has gone into a radio and refrigeration business in Abbotsford, while Rankel has taken over the business in Mission City and will operate it under the name of Rankel's Hardware. **Henry Dyke** has opened a radio and electrical service business in Rankel's Hardware. He formerly operated the electrical repair department for Merkley Electric.

● **Sylvania** Lighting Division has named **Robert C. Harper** sales manager of the Los Angeles and **William L. Friend** manager of the San Francisco office. Harper formerly was with the Electronics Division and has been San Francisco district sales manager for three years. Friend has been a field representative in the Los Angeles office since 1947.

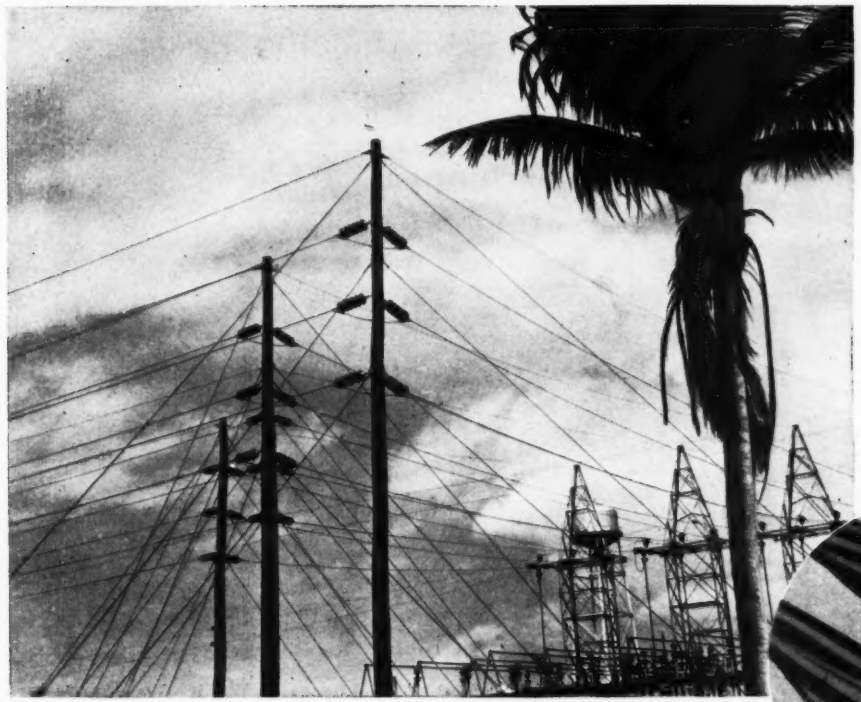
● **A & A Supply** Co., Albuquerque, N. M., is representing the Superior Switchboard & Devices Co. of Canton, Ohio, in Arizona, New Mexico and the El Paso district of Texas. **W. O. Ansley** and **Don J. Mackey** head A & A Supply.

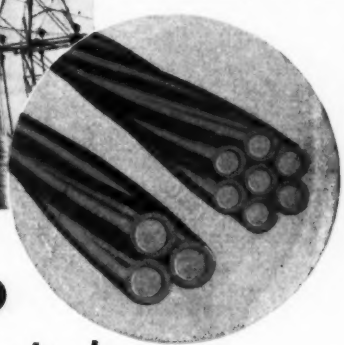
● **Lindberg Engineering** Co. of Chicago opened its West Coast plant at 11937 S. Regentview Ave., Downey, Calif., on March 25. The new factory has 12,000 sq ft of production and office space. The firm manufactures industrial heat-treating furnaces and other products.

● **Electric** log carriage drive motors for the lumber industry are now being built at the Westinghouse plant in Sunnyvale, Calif. The operation was moved from the company's eastern plants.

Builders of the World's Widest Range of Public Works Equipment

POWER LINES ARE BUSY IN FLORIDA





Copperweld Wire and Strand are permanently protected against corrosion. Each wire has a thick copper covering inseparably Molten-Welded to a strong alloy steel core.

Live Wire Utility Uses Non-rusting Copperweld TRADE MARK STRAND To Support Increasing Loads

Florida's rapid growth during the past 20 years has been little short of phenomenal. For example—population has more than doubled and industrially it is growing even faster, the number of manufacturing firms having increased 100% in the last five years.

To supply vital electric service for this expanding population growth, Florida Power & Light Company is constantly enlarging its facilities. Since VJ-Day alone, FP&L has nearly tripled its generating capability, built 4,837 miles of new lines to serve 207,630 new customers. Plans call for tripling its service within the next 10 years.

Since 1932, Florida Power & Light Company has used non-rusting Copperweld* Guy and Messenger Strand for dependable, economical overhead line construction. This progressive utility has found that once Copperweld is up, it's up to stay.

Today, in all parts of the world, many power companies, railroads and communication systems are relying on Copperweld Wire and Strand to give their overhead lines permanent, trouble-free operation at lowest annual cost. That's because each Copperweld Wire has a thick copper covering which permanently protects the high-strength steel core against rust and loss of strength. Thus, maintenance and replacement costs are eliminated; maximum continuity of service is assured.

Write us today for your copy of the Copperweld Engineering Data Book.

*Trade Mark

COPPERWELD STEEL COMPANY
Glassport, Pa.

Pacific Coast Offices:
Monadnock Bldg., San Francisco • Vance Bldg., Seattle

Copperweld TRADE MARK NON-RUSTING
GUY AND MESSENGER STRAND

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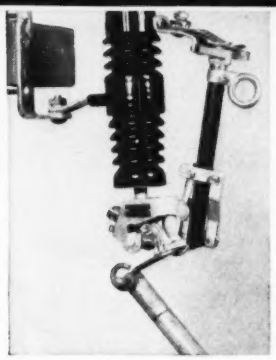
PROFILES

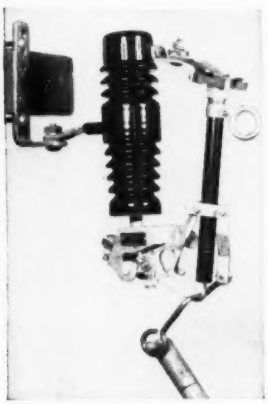
Four Washington Water Power Co. employees were named "outstanding young man" of 1952 by committees representing Spokane and Pullman, Wash., and Moscow, Idaho. Shown with J. E. E. Royer (seated), vice-president and general manager of WWP, they are: George McKay, Pullman; Harley Lyons, Moscow; Alistair McGregor, Spokane; Clement S. Stearns, Spokane. The young men were active in community affairs, helped on civic drives, headed community groups, helped in telling the private enterprise story. The company reports that only 1% of all comments in its service area were unfavorable to its employees as compared with national data pointing to 5% unfavorable comment. The participation in community affairs is entirely voluntary on the employees' part

Graduates of an intensive six-week lighting sales training course are congratulated by Southern California Edison Co. sales executives. Left to right: Roy E. Dahlin, coordinator of lighting development; G. N. Hawley, commercial vice-president; Jack Rohring, lighting engineer instructor; H. Kenneth McNees, San Joaquin Valley division; B. John Dressen, Pasadena district; Paul C. Hart, Huntington Park; Gordon L. Dovey, Long Beach; C. Kenneth Carlson, Redondo Beach; and H. C. Rice, the director of sales

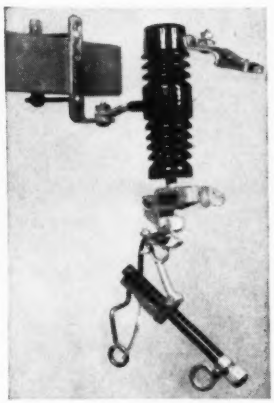
1 Fuseholder assembly showing how fuse-link cable passes over lever arm of load-break device.



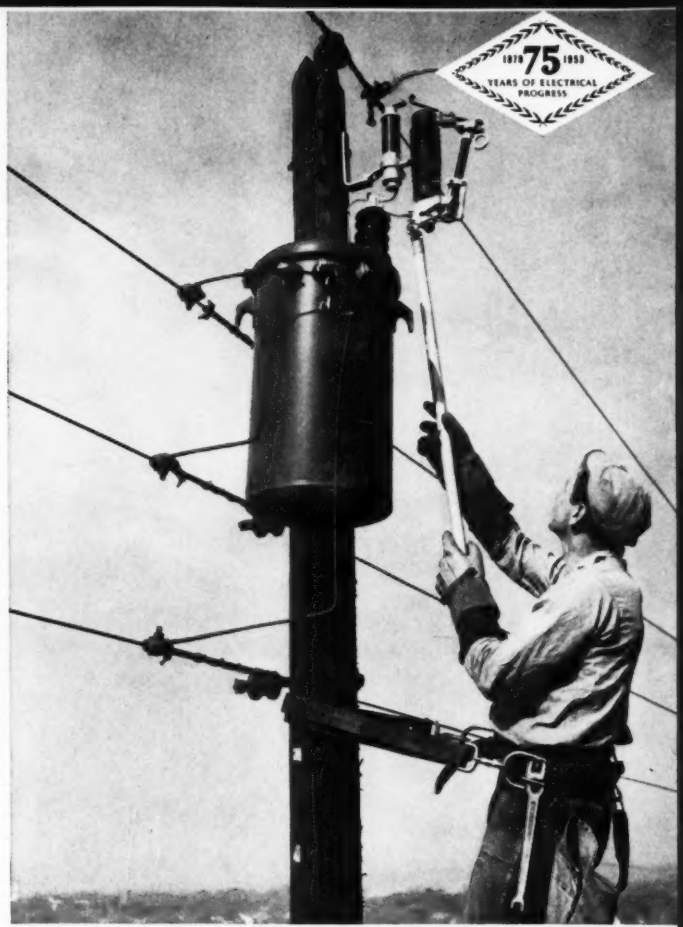
2 Downward pull on switchstick inserted in hook-eye breaks fusible element of fuse link.



3 When fuse link breaks, the cutout interrupts load current as it would interrupt a low fault current.



4 After current interruption, fuseholder drops open removing itself from the circuit.



New G-E Load-break Cutout provides easy low-cost load switching ... sectionalizing

Liberal design of G-E cutouts permits simple load-break device

General Electric's Open Dropout Fuse Cutouts—7.8 kv and 15 kv, 100-ampere ratings—now feature an optional load-break device. With it, you can switch loads or sectionalize your distribution circuits with but little increase in your cutout investment.

Fast, safer switching. The new load-break device operates by breaking the fusible element of the fuse link *with arc-interruption occurring inside the fuseholder tube.* It provides fast, safer switching of either inductive or capacitive load currents up to the 100-ampere continuous rating of the cutout. By substituting load-break fuseholders for conventional fuseholders—both 2000-ampere and 5000-ampere ratings—cutouts already in service are converted to load-break operation.

Liberal design of G-E cutouts for full-range current interruption makes them ideal for breaking load currents. It also permits an extremely simple load-break device that consists only of a stainless steel lever arm coupled to the cutout fuseholder. The load-break device has no awkward protrusions or parts to stick, bind or otherwise interfere with the dropout action of the cutout. And it does not interfere with fusing or inserting and removing the fuseholder by switchstick.

For more information on this, and other cutouts, write to *General Electric Company, Schenectady 5, New York.*

406-45

G-E OPEN DROPOUT FUSE CUTOUTS OFFER YOU MANY UNIQUE "EXTRAS"

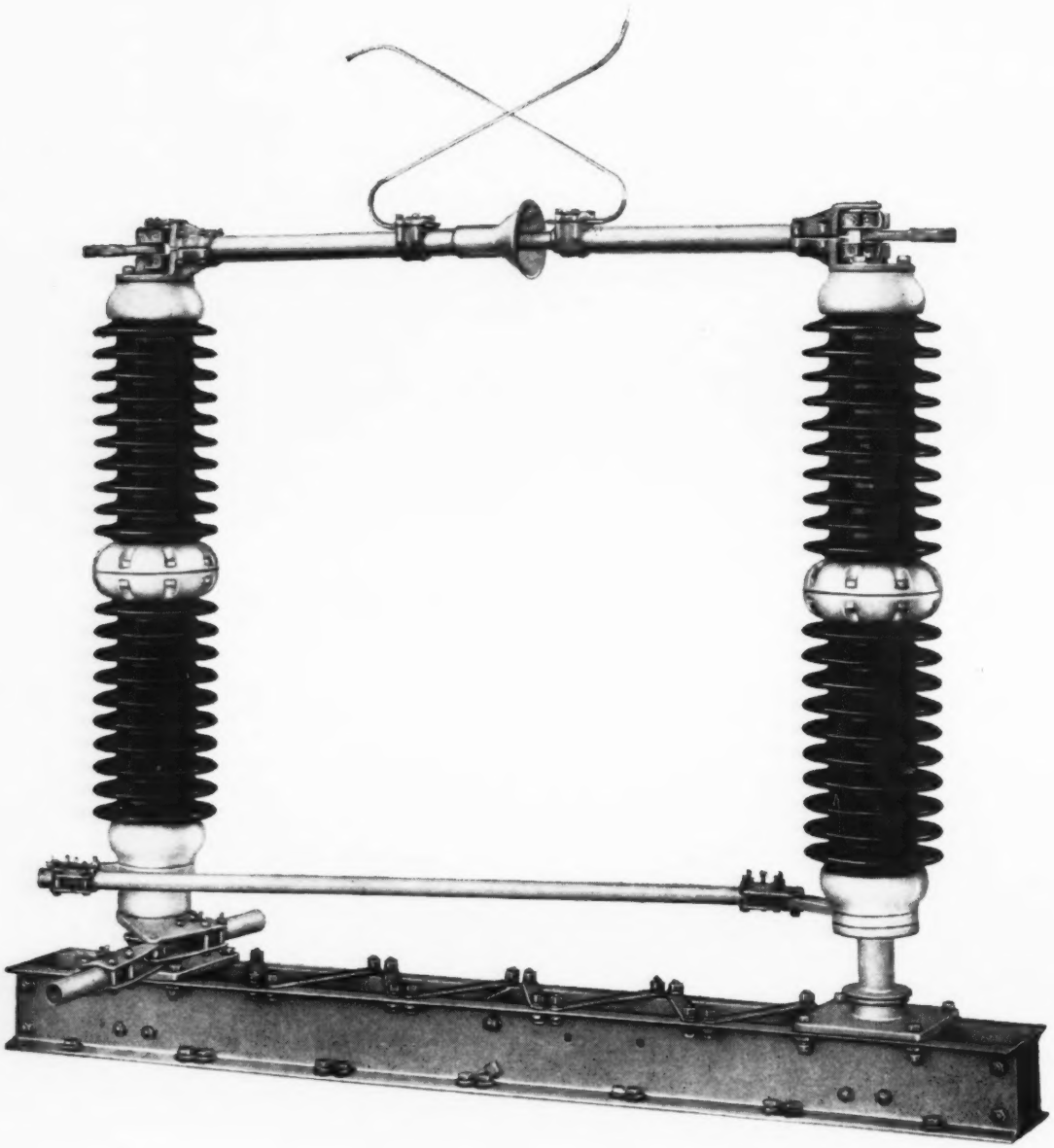
- "Birdproof construction" eliminates unnecessary fuse blowing.
- Close coupling of fuseholder to insulator, plus shock absorbers, reduces recoil stresses.
- Sealed upper end on fuseholder excludes water and controls expulsion gases.
- "Hinge guides" eliminate side-sway, provide positive contact engagement.
- Interchangeable standard and heavy-duty fuseholders—2000-amp. and 5000-amp. interrupting ratings.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Cole Electric Co.

8439 Steller Drive TExas 0-4701 Culver City, Calif.



AIR BREAK DISCONNECTING SWITCH
115,000 Volts—600 Amperes—Type PU
Horizontal Mounting—Three Pole—Center Side Break—Group Operated
SILVER TO SILVER CONTACTS
One Pole Shown
See Bulletin 40A

They're designing good lighting

The instrument above is a brightness meter. With it, trained lighting engineers can check the brightness of fixtures, walls and ceilings in the field of view, then show you how to obtain a comfortable seeing environment to boost production and reduce errors. Cost of this service to you: nothing!

Better work in less time. Good lighting removes many causes of eyestrain, helps office employees do more work per man-hour. P. G. and E. has case histories where planned lighting, by boosting efficiency, paid off in 1 to 3 years! It's easy to understand when you consider P. G. and E.'s low electric rates.

Waste of materials reduced. Planned lighting in plants increases the accuracy of precision work, helps eliminate spoilage of materials. And it also helps prevent accidents. Many California manufacturers report that modern lighting has greatly increased output—in some cases as much as 15%!

Consult your lighting contractor or P. G. and E. lighting engineer for free planned lighting advice

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

4X-53

"All together...*stroke!*"

That's right, we're all together in the P.C.E.A. boat. And for a very good and logical reason: Everyone is on the same crew! There's no lack of spirit or enthusiasm, either. P.C.E.A. members are people engaged in every phase of the electric industry—research, utilities, manufacturing, distributing, selling and servicing. And they're all working actively toward better days for the entire industry. If that's your goal, too, you'll find added strength for your business program with P.C.E.A. If you're not yet a P.C.E.A. member, we urge you to join. Get full information from either of our offices.

Pacific Coast Electrical Association

530 W. Sixth Street, Los Angeles 14 • 681 Market Street, San Francisco 5